Telephony

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CHICAGO TELEPHONE REPORT

An Exhaustive Review of the Telephone Situation as Submitted to the City Council.

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[TELEPHONY herewith presents the first half of this important contribution to telephone literature, which is the result of a thorough investigation of conditions in Chicago by a special commission of experts engaged by the city council. The remainder of the report will appear in the June issue. TELEPHONY is the first publication to print verbatim this comprehensive study of telephone conditions in the second largest city of the country, and believes the space devoted to the matter is justified by its great significance to the industry. The commission's findings with regard to service, rates and their regulation are worthy of close scrutiny. The May and June numbers of TELEPHONY, therefore, should be carefully preserved by all students of telephone conditions.—ED.]

WE HAVE industriously worked at the problems which you laid upon us at the time of our appointment as a commission to advise you on matters relating to the telephone situation in the city of Chicago, and by instructions from time to time since, and we beg leave to hand you our report.

A telephone company in a large city must face a problem in many respects more complex than that of any other public utility corporation. The water department is called upon to sell a single commodity, namely, water, and at prices which are fixed with comparative readiness. The gas company also is called upon to sell a single commodity, metered for nearly every customer, and its conditions in dealing with customers are relatively simple. It may sell some additional by-products, as coke, tar and ammonia, but the quantities and market values of these are readily arrived at. The traction company has a more complex problem than some of the other purveyors of public utilities, but even here the price paid by the several patrons is uniform and the substantial difference between patrons lies only in the lengths of the rides which they may choose to take.

The telephone problem, on the contrary, involves many complexities, partially caused by the relatively large number of classes of service which the telephone company must offer to its patrons for the purpose of fully developing the telephone service of the city, and partially by the intangible character of the electric medium with which the telephone business is carried on, the delicacy of the apparatus used, and the wide differences in the manner and extent of the use of the apparatus by the various subscribers.

If a telephone company properly extends the telephone service in the city, it must be prepared to take care of the requirements of a range of patrons as wide as the interests of the city iself, including the largest business organizations, the hotels, the newspapers, the professional men, the small business houses, and residences of all classes. It must provide apparatus for the service of each class of patrons which will enable it to furnish the service to each subscriber at an appropriate price within his means. It is desirable for the prices to be graded so that the largest user shall not pay less than his fair share of the expense of maintaining the traffic and the remuneration to the company for its investment, and equally so that the smallest user may get his telephone service at a price which is within his means and yet is reasonably remunerative to the company for its outlay.

Telephone service has been of remarkably rapid development and extension in this country. Less than fifteen years ago there was no telephone exchange system with as many as 10,000 subscribers served by the system. At that time the number of telephones in Chicago was considerably under 10,000. Only seven years ago there were less than 25,000 telephones in Chicago, and at that time the present tremendous rate of growth in the number of telephones began, the average increase during the last five years being at the rate of approximately 20,000 telephones per year. A similar increase in the growth of the number of telephones began in New York City a couple of years earlier. The bends upward in the curves showing the numbers of telephones in Chicago and New York are plainly evident on our Chart No. 4. The rapid expansion of the telephone service began in Chicago in 1900, and approximately two years earlier in New York.

Prior to the time when the rapid increase in the number of telephones began, the telephone art had been steadily changing, and the increased rate of expansion of the telephone service began approximately coincidently with the introduction into the great cities of the modern so-called "common battery" method of telephone operation. The prior apparatus used for telephone service was more expensive to operate and maintain, less convenient for the user, and not adapted for the extended use to which the telephone is now put in the large cities—all of which prevented the telephone service from becoming fully developed. The subscribers were not as well satisfied with the service which could be afforded them by the older apparatus and it was also necessary to charge higher prices.

During the recent period of tremendous growth which has followed the introduction of the "common battery" method of operation, accompanied by a service of greater convenience and lower prices, the telephone companies of the larger cities have been practically submerged in an effort to keep ahead of the demands of the people for additional telephones, and the problems relating to classification of service and appropriate charges for different classes of service have not been worked out in a suitable manner. The telephone companies have apparently been fully engaged in the extension of their business and the extension and improvement of their plants, and they have not found men or time to work at the details of operating economies and the best methods of handling the service of different classes of subscribers in the way that railroads, traction companies,

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electric light companies and various other public utility companies have been working out the details of economies relating to their processes of operation.

The telephone business is not only an unusually complex one, but the records of the existing telephone company doing a large business in Chicago are lacking in details which are needful for the fixing of specific scales of charges for different classes of service. We have endeavored to obtain data bearing on the cost of specific classes of telephone service from other telephone companies, including the Bell telephone companies of New York and elsewhere and also from certain of the so-called Independent telephone companies, but in no instance have we been able to obtain records kept in such detail or in such manner as to afford appropriate data for fixing rates, and in every instance the rates seem to have been dictated by estimates based on experience or the requirements of business expediency, instead of being founded on a knowledge of the cost of the different classes of service. The telephone companies seem to go on the belief that their business is satisfactory if the total results of each year's business show a profit, and that it is unsatisfactory if the year's business does not show a profit, and they have heretofore apparently neglected to consider more than superficially the essential question whether the rates charged deal fairly by the different classes of subscribers.

The telephone art is by no means stable. In most of the well-developed lines of industry, the art is on an advance but is advancing at a substantially stable rate. This is the condition, for instance, of the railroad art. No unforeseen or unanticipated revolutionary changes are momentarily expected to occur in the railroad art on account of discoveries or inventions, but the telephone art is different. The telephone service is now expanding at its tremendous rate largely on account of the introduction of the common battery system of operating telephones, and other improvements of more or less revolutionary character are likely to be introduced into the telephone art from time to time for decades to come.

These conditions make it impossible to arrive at any satisfactory solution of the problem of telephone rates which may be expected to extend over a period of twenty years, and we, therefore, make recommendations to you which tend toward flexibility in the operations of whatever company may receive a franchise at the hands of your honorable mayor and city council, but also reserve to the city a proper degree of authority in respect to rates.

The questions laid upon us by your instructions divide themselves into four categories:

1. The feasibility of the proposed project of the Manufacturers Telephone Company.
2. The relative merits of flat rate and measured rate telephone service.
3. The application for a franchise made by the Chicago Telephone Company.
4. The advisability of requiring universal toll connections by ordinance.

We have treated these four branches of our inquiry in the order given.

The time at our disposal was limited, but we have gone into the questions involved as deeply and as thoroughly as the time would permit.

We have called on the city auditor, Mr. Louis E. Gosselin, and city statistician, Mr. Hugo S. Grosser, for assistance, and we wish to thank them for their courtesy in aiding us in several directions. We also have conferred constantly with Alderman Linn H. Young, chairman of your committee. We have made numerous requests (courteously granted in most instances) for information and data from the engineer of the Manufacturers' Telephone Company, Mr. W. H. Johnston, and from the general manager and engineer of the Chicago Telephone Company, Mr. A. S. Hibbard and Mr. J. G. Wray. We have also informally consulted a number of other engineers of well recognized experience and capability in the telephone art, particularly several men connected with large Independent telephone installations.

Our conclusions are set forth in the last part of this report, and in the intervening portion we have given reasons for the conclusions, which we have illustrated by some maps and charts chosen from a large quantity of data which we gathered together. We believe that our conclusions are founded upon the best information which is available in the telephone world, and we have introduced the particular charts in our report for the purpose of illustrating the reasons for arriving at these conclusions.

I.

THE FEASIBILITY OF THE PROPOSED PROJECT OF THE MANUFACTURERS' TELEPHONE COMPANY.

The first matter taken up by us was the Manufacturers' Telephone Company's proposition, and through arrangements made by Mr. John M. Glenn, their engineer Mr. W. H. Johnston met with us at our second formal meeting. At this meeting Mr. Johnston stated that the estimates of plant cost, annual expense, annual revenue, etc., submitted to your committee under date of November 27, 1906, were the result of a general study of the situation, but that he had no detailed items, showing exchange districts, approximate central office locations, approximate conduit and pole line routes, quantities of materials, etc., in shape to present to us at once, and asked that he be given two weeks in which to get plans and figures in shape for presentation. Near the expiration of the time set, Mr. Johnston again appeared before us, presenting a map of the city of Chicago, upon which he had indicated fourteen central office districts, the approximate number of telephones expected to be installed in each district, approximate central office locations and the approximate extent and routes for his conduit system, which map he stated was indicative of the scope of his company's plans rather than an attempt at definite detailed design. This plan is manifestly different from the plan with eight central exchange offices which was described by the Manufacturers' company to your committee.

He also presented us with revised estimates of the cost of construction, the annual cost of operation, maintenance, etc., and of the annual gross revenue which the plant might be expected to earn. Mr. Johnston stated that he considered the estimates originally presented to your committee were adequate to meet the demands for furnishing service as outlined, but that he preferred to submit to the commission a revised plan differing from the first, but laid out to accomplish essentially the same results. The plans and estimates submitted to us do not show that the quantities of materials given as required for the outside plant construction were arrived at from the making of detailed working plans; and it is evident that these quantities were arrived at by Mr. Johnston in compiling his estimates from published information concerning the Chicago Telephone Company's plant, his personal knowledge of the conditions and requirements for telephone service in Chicago, and his general experience as a telephone engineer, and not upon a definite and detailed plan, which would include the following features determined from an extended and detailed investigation made on the ground:

Exact locations of exchange offices.

Locations of subscribers' telephones.

Exact locations of conduit routes, and quantity required.

Location, number and extent of underground and aerial cables; and

Location and extent of pole lines.

Preliminary construction estimates can be fairly accurately made following the method used by Mr. Johnston,

but both of his sets of estimates must be understood to include only preliminary figures.

Revenue estimates are based upon experience and general knowledge of the requirements of the telephone users, and cannot be accurately estimated in advance.

The expense items are based upon general experience with other operating telephone plants.

It is our understanding that your committee is proceeding upon the assumption that, if a franchise is granted to the Manufacturers' Telephone Company, it must be prepared at the expiration of the Chicago Telephone Company's franchise to satisfactorily handle all of the telephone traffic in the city, and we have proceeded on this basis.

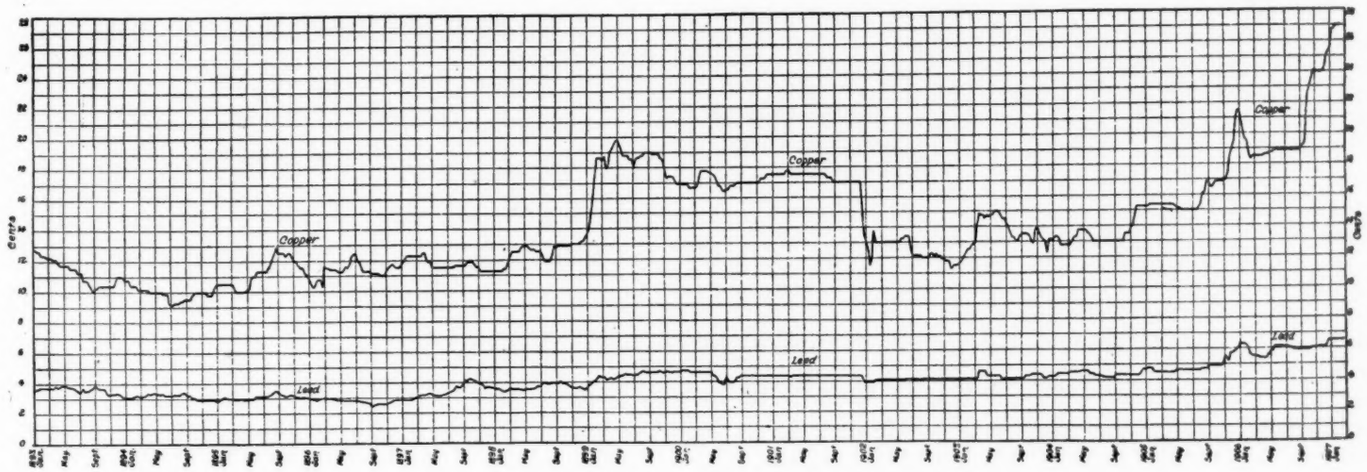


Chart A—Showing the price of copper and lead since 1893.

The Chicago Telephone Company presented to your committee extended criticisms of the Manufacturers' Telephone Company's estimates, and brought these in greater detail before the commission. A comparison of their estimates with the two sets of estimates presented by Mr. Johnston, and the results of our own carefully made estimates relating to the project of the Manufacturers' Telephone Company, is exhibited in the accompanying tables Nos. 1, 2, 3, and 4. During the making of our estimates we have made use of data and experience from every available source to which we could get access within the time at our command. In our construction estimates we provide cable and line conductors of suitable size to give an efficiency of transmission approximately equal to that now maintained by the Chicago Telephone Company. All of our figures have been carefully compiled and checked in detail, and we believe that they are as nearly correct as can be estimated by anyone at this time with the data at hand.

The revised construction estimate submitted to us by the Manufacturers' Telephone Company contemplates the construction of a telephone plant in the city of Chicago which shall be sufficiently extensive to meet all requirements for telephone service within the city limits, and one which will have an immediate installation of fourteen central offices, equipped and ready to furnish service to 110,000 subscribers' stations. It was explained to us by their engineer that the ultimate plan of development would presumably include the construction of several smaller exchange centers in the outlying districts, which centers would probably answer the same purposes as those centers now maintained by the Chicago Telephone Company and known as neighborhood exchanges. Our construction estimate has been sufficiently liberal to permit of an increase of approximately 10,000 subscribers' telephone stations without the expenditure of a considerable amount of money for extensions, but after that number of additional stations are installed it would be necessary to make extensive additions to the plant.

The form of switchboard proposed is a combination of standard manual and automatic apparatus. Subscribers would signal to and be answered by central office operators in the same manner as with the common battery switchboards now in general operation. Each operator answering calls would be provided with means for automatically connecting a calling subscriber's line with the line called for. This method of "semi-automatic" operation is represented to be particularly adapted for large multi-office exchange systems. It has never been used in actual operation in any of the large cities or in any large exchange, but the principles have been used in smaller offices and we believe that details adapting it to large exchanges will ultimately be satisfactorily worked out. This method of operation is

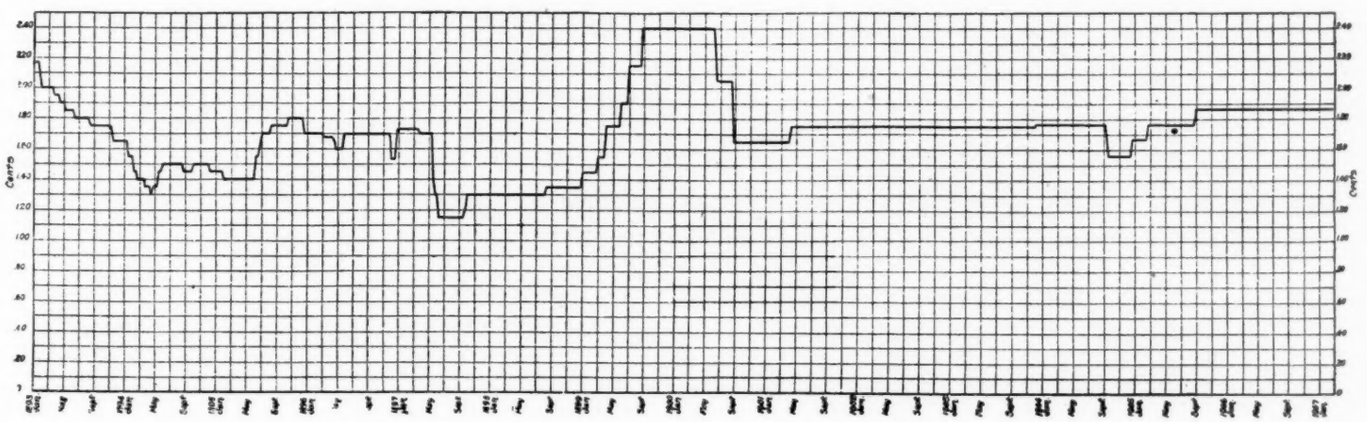


Chart B—Showing the price of steel beams and channels (structural steel) since 1893.

along the line of development which is now receiving the attention of the most competent telephone engineers in the country. It is believed that the cost of "semi-automatic" operation (when the processes have ultimately been fully developed) will be less than the cost of manual operation, for the reason that the trunking operators' services will be unnecessary, and that one operator can complete every connection required of her in practically as simple a manner as if the exchange were limited to one central office with an ordinary multiple switchboard. The subscriber's telephone would be of the regulation common battery type now used throughout the city of Chicago.

The conduit system proposed by Mr. Johnston is intended to be sufficient to ultimately meet the requirements of approximately 400,000 subscribers' stations. In compiling our conduit estimate we have given due consideration to the fact that the conduit costs in the city of Chicago are constantly increasing on account of new street improvements and the constantly increasing number of obstructions to be met with in the streets. Distribution of subscribers' lines in the conduit districts will be effected directly underground through the building basements as far as the conditions will warrant. Alley pole lines and distributing poles will be used in residence districts. The use of open line wires will be minimized by an extensive aerial cable system.

It was proposed at certain meetings of your committee that the Manufacturers' Company might rent space in the tunnels of the Illinois Tunnel Company for the purpose of installing its underground cables, but the construction estimate submitted to us by the company's engineer involves the construction of independent conduits by his company and we have followed the same plan. It is our understanding that the telephone privileges of the Tunnel company may pass to the control of a company with which the Manufacturers' company, if given a franchise, would come into competition, and any arrangement for placing the cables of the Manufacturers' company in the tunnels would be the subject of contract negotiations between the two companies and outside of our province even if the time at our command had permitted us to consider such relations.

In the estimate submitted by the Manufacturers' company, the use of No. 22 B. and S. gauge conductor cable for all subscribers' lines is proposed. The trunk line cables are proposed to be of larger conductors in order to bring the standard of transmission up to what Mr. Johnston considers a proper point. The recent great increase in the cost of metals, especially copper, lead and iron, all of which are extensively used in telephone construction work, as well as the cost of skilled labor, will make the cost of this plant, if constructed at this time, considerably more than if built a few years ago. The fluctuations in the selling prices of copper, lead and structural steel are shown in our charts Nos. A and B, plotted from weekly quotations in the Iron Age, from which it will be seen that the price of copper has been steadily increasing during the past three years, and that the present prices of copper are higher than those prevailing at any time during the past fourteen years. The price of lead, which is used very extensively in the manufacture of telephone cables, has increased approximately fifty per cent during the past five years, and is now higher than at any time during that period. It is estimated that if the cables and copper wire could be purchased at the prices prevailing two years ago a saving of a million dollars or more could be effected.

Mr. Johnston's revised estimate provides for a large central office building in the business district, in which the company's general offices would be located, and twelve smaller office buildings in the outlying districts. Also provisions are made for renting space in a fireproof building in the business district in which one of the large downtown central offices would be operated. The buildings to be constructed are proposed to be of fireproof construction.

ESTIMATES OF CONSTRUCTION COST.

Table No. 1 shows the results of the different estimates of construction cost. First, the Manufacturers' company's original estimate; second, the Manufacturers' company's revised estimate; third, the Chicago Telephone Company's estimate, and fourth, the Telephone Commission's estimate. The various items marked include the following:

TABLE NO. 1.
Manufacturers' Telephone Company—Construction Estimates

		Manufacturers' Telephone Co. Original Estimate.	Manufacturers' Telephone Co. Revised Estimate	Chicago Telephone Co. Estimate.	Telephone Commission Estimate.
1	Conduit	$ 3,425,000	$3,425,000	$4,290,000	$2,970,000
2	Pole Lines	1,350,000	1,300,000	1,350,000	1,380,000
3	Cable, underground and aerial	3,800,000	3,274,000	4,873,500	4,785,000
4	Line wires	157,500	135,000	310,500	525,000
5	Drop wires	400,000	480,000	721,000	420,000
6	Substation equipment	1,450,000	1,450,000	1,770,000	1,620,000
7	Switchboards	2,430,000	1,580,000	3,120,000	2,326,000
8	Main building	500,000	400,000	1,000,000	500,000
9	Small buildings	300,000	432,000	600,000	480,000
10	Fitting rented space	25,000	15,000	.....	15,000
11	Tools and supplies	*a* 235,000	235,000	*a* 770,000	250,000
12	Furniture and fixtures	15,000	20,000	50,000	25,000
13	Supervision and engineering	250,000	600,000	917,750	700,000
14	Interest and insurance	750,000	*c* 550,000	*b*90,000	600,000
15	Bank Balance	100,000	*d* 400,000	500,000	300,000
	Total	$15,007,500	$14,296,000	$20,362,750	$16,896,000
6	Brokerage	.....	687,300	.....	1,877,333
	Total investment	.....	$14,983,300	.....	$18,773,333

a—Includes stable and supply buildings.
b—Insurance only.
c—Interest only.
d—Bank balance and insurance.

1. Conduit: Main line and subsidiary conduit, including river crossings, vaults, manholes, etc., complete, ready for receiving underground cables.

2. Pole lines: Poles set in place, painted, stepped, guyed and fitted with crossarms and fixtures.

3. Cable: Underground and aerial cable, in place, properly terminated and ready for service, also suspension wires and guying for aerial cables.

4. Line wires: All open air wires attached to poles, exclusive of drop wires.

5. Drop wires: Wires extending from poles or fixtures to subscribers' buildings.

6. Substation equipment: This includes 110,000 subscribers' telephones, installed ready for operation, a portion of which will be connected with private branch exchange switchboards.

7. Switchboards: Central office and private branch exchange switchboards, installed ready for operation.

8. Main building: Main office building and land in the central district, ready for occupancy.

9. Small buildings: Same as above in outlying districts.

10. Fitting of rented space in fireproof building in central district ready for installation of central office apparatus.

11. Tools and supplies: All tools and supplies necessary for the construction, maintenance and operation of the plant.

12. Furniture and fixtures: All furniture and fixtures necessary for the construction, operation and maintenance of the plant.

13. Supervision and engineering: All necessary supervision and engineering during the designing and construction of plant.

14. Interest and insurance: Interest on investment during construction of plant and insurance on buildings, apparatus, material and supplies during construction.

15. Bank balance: Working capital necessary for operation of plant.

16. Brokerage: Difference between amount of securi-

ties issued and cash received for same. It is estimated that this will equal at least ten per cent of amount issued.

ESTIMATES OF ANNUAL EXPENSE.

Table No. 2 shows the results of the different estimates of annual expense. The various items marked include the following:

TABLE NO. 2.

Manufacturers' Telephone Company—Annual Expense Estimates.

		Manufacturers' Telephone Co. Original Estimate.	Manufacturers' Telephone Co. Revised Estimate.	Chicago Telephone Co. Estimate.	Telephone Commission Estimate.
	OPERATION—				
1	Switchboard operation, etc.	$600,000	$739,440	$1,664,300	$739,440
2	Service inspection, etc.	27,000	.....	27,000	12,000
3	Contract department	125,000	74,000	80,000	74,000
4	Accidents and damages	25,000	.....	25,000	25,000
5	Advertising	20,000	20,000	60,000	20,000
6	Collecting	50,000	68,000	75,000	70,000
7	Rent	15,000	15,000	15,000	15,000
8	Directory	300,000	300,000	15,000	90,000
	MAINTENANCE—				
9	Switchboard repairs, etc	100,000	.....	.....	125,000
10	Line and telephone repairs	375,000	364,760	.....	467,500
11	Cable repairs	75,000	70,000	.....	100,000
12	Conduit repairs	10,000	10,000	.....	10,000
13	Pole line repairs	25,000	50,000	.....	60,000
14	Line wire repairs	25,000	25,000	.....	35,000
15	Telephone and P.B.X. inspections	50,000	50,000	.....	60,000
16	Out orders, plant changes, etc	175,000	175,000	1,205,600	200,000
17	Care of buildings, etc	50,000	50,000	100,000	50,000
	GENERAL—				
18	Legal	25,000	.....	50,000	25,000
19	Taxes	75,000	.....	147,000	150,000
20	Insurance	100,000	.....	50,000	50,000
21	Salaries, stationery, etc.	350,000	550,000	320,000	320,000
22	Uncollected accounts	25,000	25,000	74,000	40,000
23	Reserve for repairs	100,000	390,000	100,000	300,000
24	Additional to equal M.& M.estimate	261,000	.....	.....	.....
	Total	$2,983,000	$2,976,200	$4,142,900	$3,037,940
25	Compensation to City	256,650	253,840	185,000	235,670
26	Depreciation	750,000	756,200	1,000,000	906,360
27	Interest 5 per cent	750,000	750,000	1,018,137	938,666
	Total annual expense including interest	$4,739,650	$4,736,240	$6,346,037	$5,118,636

1. Switchboard operation, etc.: Expense for making switchboard connections and supervision thereof, expense for maids, cleaners, matrons, and janitors, operators' school, operators' restaurant supplies, heat, light, power and supplies for operators' quarters and operating rooms.

2. Service inspection: Traffic records, extra cost of "peg count" and special operating supervision.

3. Contract department: Contract agent, assistants, clerks, solicitors, stationery, postage, car fares, etc.

4. Accidents and damages: Cost of adjusting claims for accidents and damages.

5. Advertising: Newspaper and general publicity advertising.

6. Collecting: Superintendent of collections, collectors, bookkeepers, clerks, stationery, postage, car fares, etc.

7. Rent: Rent of large central office in downtown district.

8. Directory: Compiling, publishing and delivering directory.

9. Switchboard repairs: Switchboard repairs, main and intermediate distributing frame jumpers, switchboard lamps, cords, etc., and maintenance supplies.

10. Line and telephone repairs: Repairing line and instrument trouble, etc., car fares, maintenance supplies, etc.

11. Cable repairs: Repairs on underground and aerial cables, electrolysis tests, labor, materials, etc.

12. Conduit repairs: Repairs on conduits, laterals, pavements, etc., labor and materials.

13. Pole line repairs: Repairs on pole lines, straightening, guying, moving poles, etc., labor and materials.

14. Line wire repairs: Repairs to open line wires, removing slack, taking down dead wires, etc., labor and materials.

15. Telephone and private branch exchange inspections: Inspection and repairs of telephones and apparatus not at central offices, including private branch exchange switchboards, labor and materials.

16. Out orders, plant changes, etc.: Instruments removed, moved, poles moved, etc., labor and materials.

17. Care of buildings, etc.: Building repairs, repairs of tools, janitors' supplies, etc.

18. Legal: General legal expenses.

19. Taxes: City, county and state taxes.

20. Insurance: Fire and accident insurance.

21. Salaries, stationery, etc.: General executive and clerical force, stationery, postage, light, heat and traveling.

22. Uncollected accounts: Charge off account of uncollected rentals earned.

23. Reserve for repairs: Reserve for extraordinary repairs, emergencies and other charges not directly chargeable to routine expense.

24. Additional to equal McMeen and Miller estimate: Total difference between Manufacturers' company's original estimate and estimate prepared by McMeen and Miller for that company, details of which have not been placed in our hands.

25. Compensation to city: Five per cent of gross receipts as provided in the proposed franchise submitted by the Manufacturers' Telephone Company.

26. Depreciation: Annual amount to be charged off for depreciation in value of plant.

27. Interest: Five per cent interest on the investment.

ESTIMATES OF ANNUAL REVENUE.

Table No. 3 shows the different estimates of the revenues which may be expected to be derived from the operation of the plan, if constructed as contemplated.

TABLE NO. 3.

Manufacturers' Telephone Company—Annual Revenue Estimates.

	Manufacturers' Telephone Co. Original Estimate.	Manufacturers' Telephone Co. Revised Estimate.	Chicago Telephone Co. Estimate.	Telephone Commission Estimate.
BUSINESS TELEPHONES—				
Direct line, unlimited	$450,000	$1,215,000	.....	$1,080,000
Two-party line, unlimited	600,000	1,080,000	.....	960,000
Direct line, measured	492,000	104,400	.....	91,200
Two-party line, measured	522,000	180,000	.....	120,000
Four-party line, measured	820,000	243,000	.....	224,000
Extension sets, unlimited	60,000	37,800	.....	24,000
Extension sets, measured	65,000	10,850	.....	9,800
Private branch exchange, switchboa'ds	14,000	28,000	.....	28,000
Trunk lines, unlimited	140,000	350,000	.....	350,000
Trunk lines, measured	91,200	80,000	.....	80,000
P. B. X. Telephones	60,000	111,000	.....	96,000
RESIDENCE TELEPHONES—				
Direct line, unlimited	180,000	180,000	.....	180,000
Two-party line, unlimited	225,000	270,000	.....	315,000
Four-party line, unlimited	210,000	210,000	.....	300,000
Direct line, measured	212,000	144,000	.....	136,000
Two-party line measured	252,000	200,000	.....	184,000
Four-party line, measured	207,000	189,000	.....	288,000
Extension sets, unlimited	20,000	10,000	.....	12,000
Extension sets, measured	30,000	2,750	*3,680,600	4,400
Private lines, extension bells, etc	70,800	71,000	19,400	71,000
Tolls and pay stations	212,000	160,000	.....	160,000
Directory advertising and other reven.	200,000	200,000	.....	.....
Total annual revenue	$5,133,000	$5,076,800	$3,700,000	$4,713,400

*Total earnings all exchange telephones.

Our estimate of the revenue that would be earned through the operation of the plant has been carefully compiled, basing our judgment of the proportion of the subscribers who will choose the different classes of service upon the characteristics of the telephone users of Chicago as indicated by our information regarding the numbers of subscribers in the different classes of service of the Chicago Telephone Company. The essential difference between our estimate and the revised estimate of the Manufacturers' Telephone Company is that their estimate is based upon 70,000 business telephones and 40,000 residence telephones. We believe that the proportion of business to residence telephones will more nearly equal 60,000 business and 50.000 residence for

the first 110,000 secured, and that after this number has been secured and the telephones placed in operation, then the residence telephones will increase more rapidly than the business telephones.

The Chicago Telephone Company's estimate of revenue to be derived from the Manufacturers' project is given in total only, their estimate having been made by applying the Manufacturers' proposed rates to their own subscribers in their several classes in such a way that the various items could not be easily reduced to the 110,000 telephones proposed to be operated by the Manufacturers' Telephone Company.

It will be noted that the estimates made by the Manufacturers' company show a revenue item of $200,000 under the designation of "revenue from other sources," and it was explained by Mr. Johnston that this revenue would come principally from advertisements in their telephone directory. It was thought best by us, however, in our estimate to reduce the cost of publishing their directory, which you will note has been done on Table No. 2, from $300,000 to $90,000 and to omit this item from their revenues.

Table No. 4 is a comparative summarization of the preceding tables showing the various estimates of the final net earning capacity of the project. Of the four sets of figures submitted, we believe the set computed by us to be the most nearly correct. The figures of the Manufacturers' Telephone Company are too optimistic, while those presented by the Chicago Telephone Company are too pessimistic. Reducing the compensation to the city to three per cent would affect our estimate of the net earning capacity of the Manufacturers' project quite materially, but even this would not enable that company to derive sufficient funds from the proposed rates and method of charging to meet reasonable depreciation charges and pay interest on the investment, but would still leave an annual deficit of approximately $311,000.

COMPARATIVE SUMMARY OF ESTIMATES.

TABLE NO. 4.

Manufacturers' Telephone Company—Summary of Estimates.

	Manufacturers' Telephone Co. Original Summary.		Manufacturers' Telephone Co. Revised Summary.	
Investment cost of plant		$15,007,500		$14,983,300
Gross revenue		5,133,000		5,076,800
Annual expense (operating, etc.)	$2,983,000		$2,976,200	
Compensation to City, 5% gross revenue	256,650		253,840	
Depreciation	750,000	3,989,650	756,200	3,986,240
Net return		$1,143,350		$1,090,560
Interest on investment 5%		750,000		750,000
Surplus		$ 393,350		$ 340,560

	Chicago Telephone Co. Summary.		Telephone Commission Summary.	
Investment cost of plant		$20,362,750		$18,773,333
Gross revenue		3,700,000		4,713,400
Annual expense (operating, etc)	$4,142,900		$3,037,940	
Compensation to City, 5% gross revenue	185,000		235,670	
Depreciation	1,000,000	5,327,900	906,360	4,179,970
Net return				$ 533,430
Deficit		$1,627,900		
Interest on investment 5%		$1,018,137		938,666
Deficit		$2,646,037		$ 405,236

The item of depreciation in our estimate is figured at the rate of 6 per cent on a first cost of $15,106,000, covering plant and buildings; and we have also included a reserve fund of $300,000 per annum for repairs, which would be used for reconstruction of operating plant, made necessary by city improvements, etc. This sum of $300,000 is practically 2 per cent of the $15,106,000, giving an aggregate for the annual contributions to a fund for depreciation, reconstruction and insurance of 8 per cent of the cost of the operating plant. A detailed study of depreciation and reconstruction is presented in the latter part of this report, and the percentage arrived at in the computations there exhibited, agrees with the foregoing.

Our conclusion is that the project as laid out, with the rates and classes of service offered, would prove unprofitable and that eventually it would be necessary for the Manufacturers' company to either increase or abandon its flat rates or restrict its service within a limited area to subscribers at the higher rates of service.

If the flat rates proposed by the Manufacturers' company were abandoned and the company should go into operation with only the measured rates printed in the proposed franchise of the company, it is our opinion that the earnings would then be sufficient to sustain the operations of the company and pay fair dividends on the investment. This, however, is contrary, as we understand it, to the intention of the Manufacturers' company and we have not therefore gone into a farther study of such a plan. Our Chart No. 1, compares the average prices per message under the measured rates proposed by the Manufacturers' company with those proposed by the Chicago Telephone Company, from which it will be seen that the measured rates of the two companies make substantially no difference up to a use equaling 2,500 messages per year (which is within the range of ordinary users), while for greater use, the rates of the Manufacturers' company fall lower than those of the Chicago Telephone Company, and for a use of 10,000 messages per year, they are approximately ten per cent less. This difference is made possible by the fact that the conditions in the franchise proposed by the Manufacturers' company insures to them a renewal of their grant at its expiration or a reasonable payment for the property, whereas the conditions in the franchise proposed by the Chicago Telephone Company does not contain any such provision.

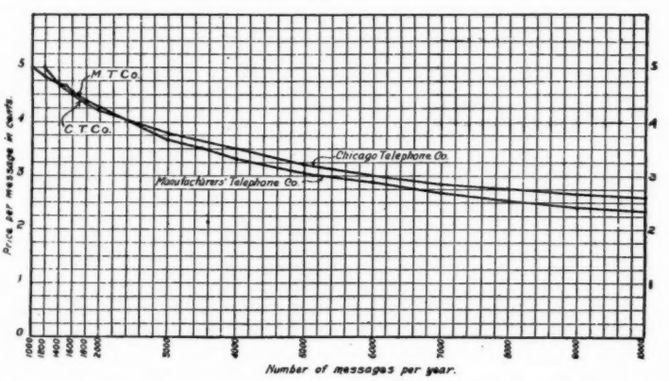


Chart No. 1—Chart showing comparative rates per message for direct line measured service business telephones, according to quantity used per year, proposed by Chicago Telephone Company and Manufacturers' Telephone Company.

Regarding the possibility of constructing such a plant as planned, within a period of two years from the granting of a franchise, we report that we have considered this matter carefully, have advised with some well known telephone engineers who have been engaged with extensive telephone construction work, and have come to the conclusion that such a project would be practically impossible of accomplishment. The Manufacturers' company has furnished us with letters from various manufacturers and dealers in materials and supplies of the kinds necessary for the construction of the plant, each of which states that that particular manufacturer or dealer would be able to supply his share of the material or equipment needed within the time specified; but our experience with dealers and manufacturers leads us to the conclusion that such promises as these are seldom fulfilled, and that when large quantities of supplies, such as would be necessary for the construction of this plant, are required within a comparatively short time, they are to be had only by the payment of premiums, and often cannot be had at all within the time that they are desired. The selection and purchase of thirteen building

sites together with the preparation of building plans, etc., and the construction of buildings it is believed would require of itself upwards of eighteen months. The matter of securing the necessary amount of skilled labor for the construction of the plant as proposed, within the time limit of two years, would be very difficult and perhaps impossible.

We believe that it would require at least four years to construct and put into comprehensive operation a telephone system that could successfully replace the present service of the Chicago Telephone Company.

II.

THE RELATIVE ADVANTAGES AND DISADVANTAGES OF FLAT RATES AND MEASURED RATES FOR TELEPHONE SERVICE.

In order to give the best possible telephone service, the following features should be maintained at the highest possible standard by the company furnishing the service:

The telephone plant should be engineered and constructed along broad lines, and with ample facilities for handling the business and taking care of future development.

There should be provided suitable means for quickly and accurately connecting and disconnecting subscribers' lines.

There should also be provided suitable means for accurately signaling the subscriber desired without the knowledge of any other subscriber.

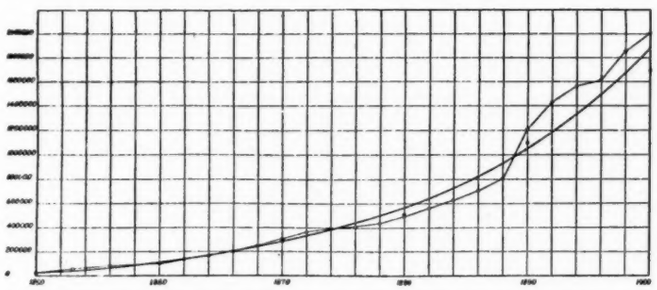


Chart No. 2—Showing population of Chicago in the past, taken from school census and federal census reports. Dot shows federal census.

DATA FOR CHART NO. 2.

Showing population of Chicago in the past, taken from school census and federal census reports:

Year.	Population, School Census.	Population, Federal Census.
1850	29,963	28,269
1853	50,130	.....
1856	84,113	.....
1860	.....	109,206
1862	138,186	.....
1864	169,353	.....
1866	200,418	.....
1868	252,054	.....
1870	306,605	298,977
1872	367,396	.....
1874	395,408	.....
1876	407,661	.....
1878	436,731	.....
1880	491,516	503,298
1882	560,693	.....
1884	629,985	.....
1886	703,817	.....
1888	802,951	.....
1890	1,208,669	1,099,850
1892	1,438,010	.....
1894	1,567,727	.....
1896	1,616,635	.....
1898	1,851,588	.....
1900	2,007,695	1,698,575

All lines should be free from inductive disturbances, and of sufficient carrying capacity to provide for a high standard of transmission.

The speech transmitting and receiving devices should be of the best quality, and carefuly maintained.

The plant should be well constructed and maintained.

The number of cut-offs which interrupt communications should be reduced to a minimum.

The number of "busy reports" and other unavailing calls should be reduced to a minimum.

All interference with conversation between subscribers should be reduced to a minimum.

The work required of the subscribers should be reduced to a minimum.

All of the plant employed in providing service should be under the control of one corporation or organization.

The company furnishing the service should provide courteous treatment to all of its subscribers, and should promptly and fully follow up and satisfactorily adjust all complaints.

An accurate directory of subscribers' telephone numbers should be provided.

The term flat rates in telephone service ordinarily means the manner of charging for service which consists in mak-

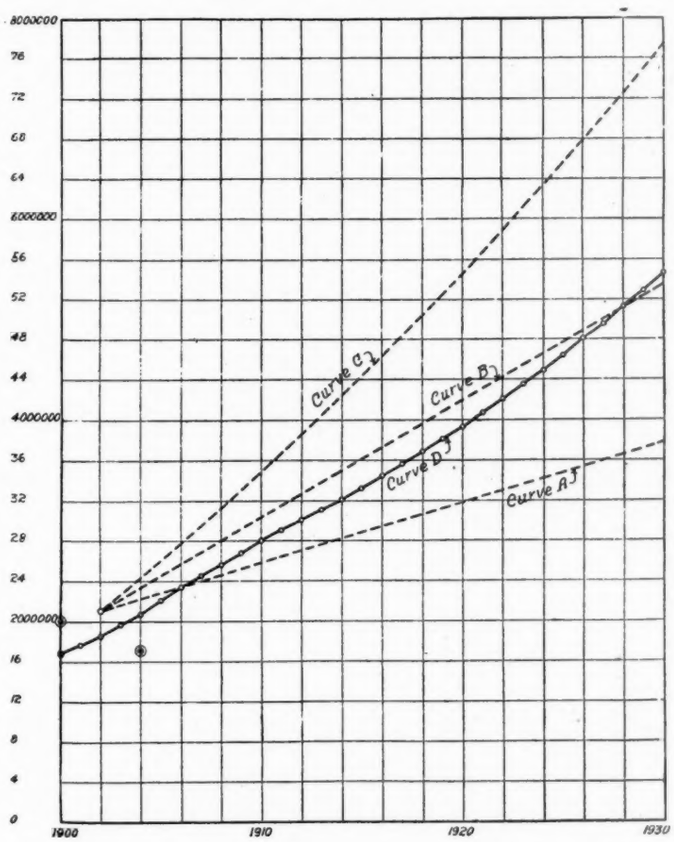


Chart No. 3—Showing probable future growth in population of Chicago. Curves A, B and C correspond with the estimates made by Mr. B. J. Arnold, which are published as curves G, H and I on Plate No. 14 of his first traction report. Curve D is the estimate of City Statistician Grosser. Dot shows federal census. Dot with circle shows school census.

ing a fixed charge per year for furnishing the subscriber with a telephone instrument in his place of business or residence, and a suitable line or lines and means for connecting, so that he may converse with other subscribers at will. This price is a survival of the idea that a telephone company rents apparatus and telephone lines, and is based upon the theory that the cost of providing service for any subscriber to a particular class of service will be very nearly equal to the average cost in that class of service. The subscriber with this arrangement is authorized to make as frequent or infrequent use of his telephone as his requirement or convenience warrants, and all subscribers of the same class are presumed to pay the same price. The warrant for this equality in the price charged subscribers who may make use of their telephones in widely different degrees, lies only in an assumption that the expense of the service is almost altogether a matter of providing the lines and the apparatus, and that the cost of providing each subscriber's service is

practically independent of the number of times the instrument may be used for communications.

By measured rate service is ordinarily meant a service which is carried on upon the assumption that the telephone company is organized for the purpose of giving telephone service, as distinguished from the renting of instruments and lines. This, in our view, is clearly the proper duty of the telephone company, and any franchise granted to a telephone company should be drawn from this view. The provision of instruments and lines, and the other articles of equipment of the telephone company, is made purely for the purpose of enabling subscribers to transmit messages between each other with the greatest practicable convenience and dispatch. It is therefore the transmission of messages which constitutes the duty of the telephone company, and the measured rates go upon the assumption that the telephone company should be paid for the performance of this specific duty.

In connection with the measured rate service it is, of course, obvious that the company must furnish its subscribers with suitable telephone instruments and lines, and also provide the necessary equipment for making connections to

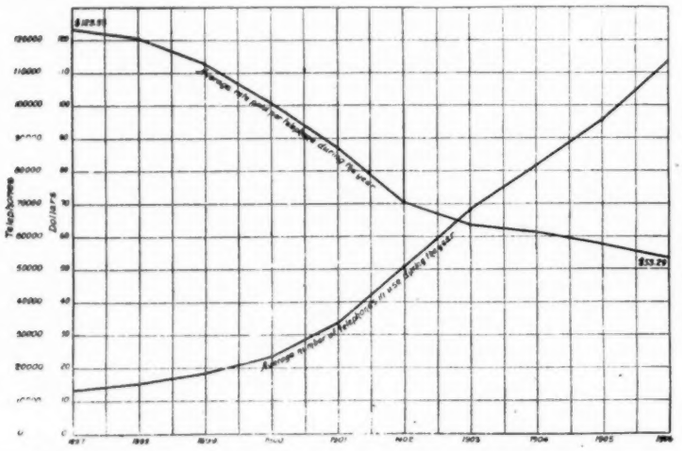


Chart No. 4—Showing the change in the average price paid each year per telephone in Chicago for the last ten years.

DATA FOR CHART NO. 4.

Showing the change in the average price paid each year per telephone in Chicago for the last ten years, excluding "neighborhood" telephones.

Year.	Average Number of Telephones in Use During the Year.	Average Rate Paid per Telephone During the Year.
1897	13,163	$123.53
1898	15,020	120.47
1899	18,377	112.80
1900	23,586	100.81
1901	33,831	87.22
1902	50,642	70.33
1903	68,271	63.99
1904	81,445	61.14
1905	95,566	57.79
1906	113,782	53.29

complete the intercommunications between subscribers, and for this reason it is appropriate for a company making measured rate charges, to exact a guarantee that there shall be not less than a fixed minimum number of messages or that the rate paid for service at each telephone shall not fall below a certain reasonable amount per annum. This amount will include the transmission of messages up to an appropriate number, over and above which an additional small charge may properly be made per message.

The ideal method of charging for telephone service is obviously to charge each customer in proportion to the service he receives from the company, and to make the charges of all customers as low as is consistent with the operation and maintenance of the property, and the payment of a fair return on the money invested. When flat rates are charged, two classes of customers are ordinarily differentiated, namely (a) business customers, and (b) residence customers. In each class there may be subdivisions due to the arrangement of individual customers on a single line or two,

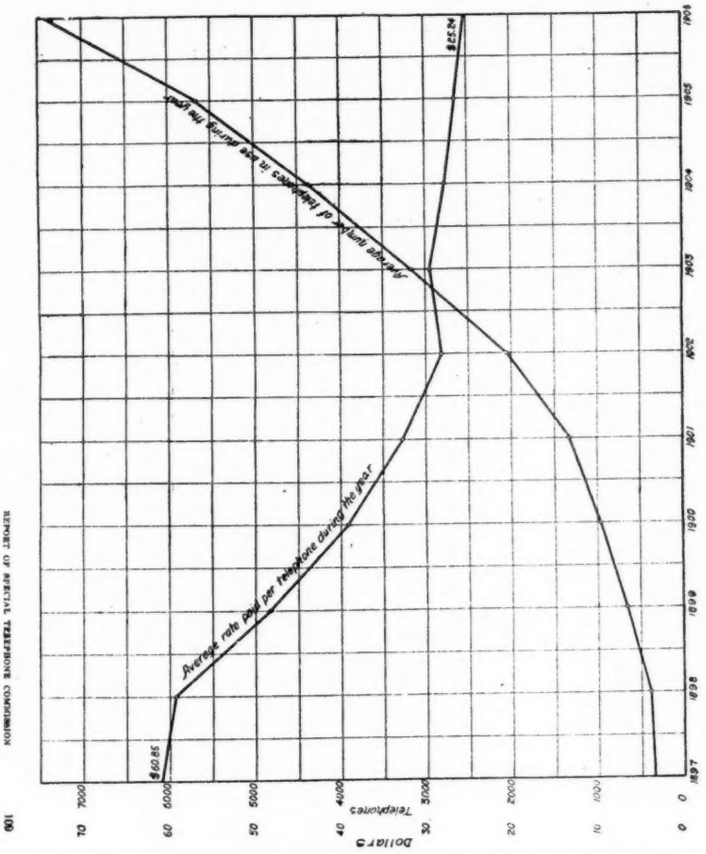


Chart No. 5—Showing the change in the average price paid each year per telephone in the neighborhood exchange districts for the last ten years.

DATA FOR CHART NO. 5.

Showing the change in the average price paid each year per telephone in the "Neighborhood Exchange" Districts for the last ten years.

Year.	Average Number of Telephones in Use During the Year.	Average Rate Paid per Telephone During the Year.
1897	352	$60.85
1898	393	59.25
1899	655	48.29
1900	977	39.04
1901	1,325	32.77
1902	2,042	28.15
1903	3,170	29.43
1904	4,366	27.72
1905	5,674	26.42
1906	7,404	25.24

three, four, or more customers on a party line, but none of these subdivisions can be made except on the basis of differences in the amount of equipment required for each customer. It is true that the differentiation between a business customer and a residence customer, which is oftentimes made, is justified on the ground that the residence use of telephones averages smaller than the business use, but no grading as between the different business establishments, or between one residence and another, can be made by that process when flat rates are adopted as the method of charging the subscribers. The result of this obviously must be, assuming that a company's total receipts are sufficient to pay

for the cost of operating and maintaining its property and paying interest on the money invested, to give some of the customers on the flat rate a great deal more service than others receive, so that the smaller users manifestly pay more than their service should require, while the larger users who keep their telephones constantly busy, receive a service of much greater value and expense to the company than is justified by the annual bills which they pay. These large consumers under the flat rates also interfere with the traffic of the smaller users by keeping their lines so busy that the smaller users are unable to conveniently get into conversation with the busy lines, thus causing unavailing calls for connections which are expensive to the company and annoying to the customers.

The greatest range of rates that it is possible to make with the flat rate arrangement is relatively small, the difference between the highest paying flat rate customer and the lowest paying flat rate customer being comparatively small,

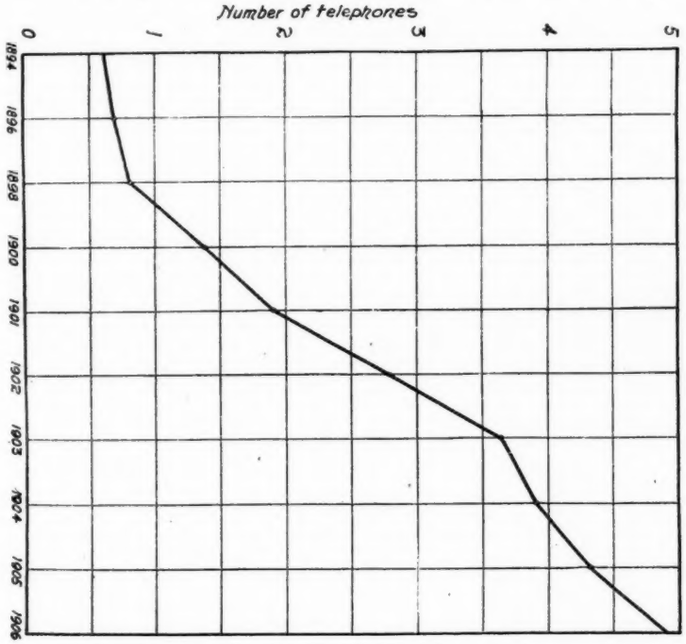


Chart No. 6—Showing the number of telephones in use in Chicago for each 100 inhabitants.

DATA FOR CHART NO. 6.

Showing the number of telephones in use in Chicago for each one hundred inhabitants.

Year.	Population.	Average Number of Telephones.	Number of Telephones per One Hundred Inhabitants.
1894	1,567,727	9,594	.61
1896	1,616,635	11,034	.69
1898	1,851,588	15,020	.81
1900	1,698,575	23,586	1.39
1901	1,773,939	33,831	1.91
1902	1,863,833	50,642	2.80
1903	1,970,450	68,271	3.65
1904	2,075,528	81,445	3.92
1905	2,206,009	95,566	4.33
1906	2,341,420	113,782	4.86

and this tends to retard telephone development and prevent its general use.

The measured rate arrangement manifestly makes it possible to reduce the price of the telephone to the small user to the smallest possible annual charge, that is, to a charge which is just sufficient to cover a reasonable interest and depreciation for the portion of the plant that must be set aside for the use of that individual user (or the average of the users in his particular class), increased by an amount which is proportional to the actual number of messages transmitted from his telephone in the year. It is only by this arrangement that large city service may be extended to the small business men and the small residence and apartment dwellers who may be unwilling to pay more than from eighteen to twenty-four dollars per year, and this sort of customers constitutes a remarkably large proportion of the total telephone-using population of a large city like Chicago. When the measured rates are introduced exclusively, and carried to their logical conclusion, it may increase the cost of telephone service to the largest business users, but these users are even then charged no more than the actual service rendered to them costs the company, plus the appropriate amount to represent interest on the investment; and it is an obvious business principle that each class of service should not only be satisfactory to the users, but should also return its reasonable proportion of remuneration to the company furnishing the service.

In the discussion below, we have endeavored to point out by the use of charts, some of the features pertaining to the flat rate and the measured rate, so as to show the way in which the measured rate tends toward the diffusion of telephone service which makes it of greater advantage to the people of the city considered as a whole, while the flat rate tends toward its contraction.

Our charts, Nos. 2 and 3, show the growth of population

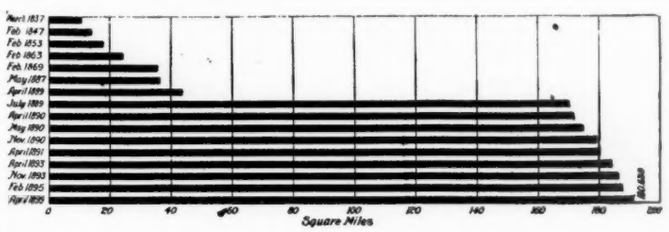


Chart No. 7—Showing growth of the area of the city of Chicago.

DATA FOR CHART NO. 7.

Showing the growth of the area of the city of Chicago.

	Number of Square Miles.
Total area, March 4, 1837, the date of incorporation	10.635
First extension, February 16, 1847	3.375
Second extension, February 12, 1853	3.988
Third extension, February 13, 1863	6.284
Fourth extension, February 27, 1869	11.380
Fifth extension, May 16, 1887	1.000
Sixth extension, April 29, 1889	7.150
Seventh extension, July 15, 1889	126.070
Eighth extension, April 1, 1890	1.773
Ninth extension, May 12, 1890	2.899
Tenth extension, November 4, 1890	4.603
Eleventh extension, April 7, 1891	0.981
Twelfth extension, April 4, 1893	3.875
Thirteenth extension, November 7, 1893	2.125
Fourteenth extension, February 25, 1895	1.000
Fifteenth extension, April 4, 1899	3.500
Total area to date, square miles	190.638

of the city of Chicago in the past, and the estimated future growth. Chart No. 2 shows by the black dots the population given by the United States census at the end of each decade, and the open circles which are joined by lines show the population given by the school census reports. The full curved line indicates the average curve of growth of the city. It will be seen from this chart that the city population has been growing at a tremendous rate during the last decade, and that it shows no tendency to hesitate in its growth. Chart No. 3 shows the probable future growth of the city, curves A, B and C corresponding with the estimates given by Mr. Bion J. Arnold in his report on the traction situation, starting at an assumption of 2,100,000 inhabitants in the year 1902. Curve D shows an estimate of future city growth made by City Statistician Grosser, for our use. It starts from the figure of the federal census of

1900. Mr. Arnold's average curve (curve B) and Mr. Grosser's curve cross each other at the year 1928, and the indication of the curves is that the population of the city will not be far from 5,000,000 inhabitants at that time, and that it will probably exceed 5,000,000 inhabitants by as much as a quarter of a million by the opening of 1929. Mr. Arnold's lowest curve, curve A, indicates a population at the opening of 1929, of approximately 3,750,000. It may be expected that the population at the opening of 1929 will therefore

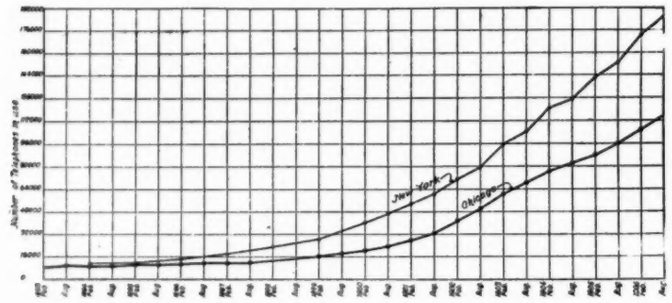


Chart No. 8—Showing the growth in numbers of telephones in use in Chicago and New York.

DATA FOR CHART NO 8.

Showing the growth in numbers of telephones in use in Chicago and New York.

Month.	Year.	Number Telephones, Chicago. Exchange District.	Number Telephones, New York. (Manhattan and Bronx.)
February,	1893	8,679	.....
August,	1893	9,751	.....
February,	1894	9,443	11,218
August,	1894	9,744	.....
February,	1895	9,980	11,853
August,	1895	10,467	.....
February,	1896	10,777	14,647
August,	1896	11,291	.....
February,	1897	11,479	18,173
August,	1897	11,658	.....
February,	1898	.....	23,046
August,	1898	.....	.....
February,	1899	16,310	28,423
August,	1899	18,013	.....
February,	1900	20,380	40,437
August,	1900	23,187	.....
February,	1901	27,929	53,394
August,	1901	32,728	60,877
February,	1902	41,232	71,219
August,	1902	50,118	79,686
February,	1903	60,588	95,801
August,	1903	68,508	104,392
February,	1904	76,218	120,855
August,	1904	82,217	127,592
February,	1905	87,847	142,951
August,	1905	96,260	152,810
February,	1906	105,861	173,539
August,	1906	115,427	186,120

be as much as 5,250,000, and certainly not less than 3,750,000. At the present time (1907), the telephone development in the city of Chicago shows between five and six telephones for each 100 inhabitants. It is our opinion that this development will expand with improved and cheaper service, until there are at least ten telephones for each 100 inhabitants, and the telephone development which must be planned to occur before the opening of 1929, should be made with a view of providing the system with as many as 500,000 telephones and perhaps 600,000 telephones. Four hundred thousand telephones is too low an estimate to be reasonable, especially in consideration of the fact that a first-class and cheapened service is likely to increase the number of telephones beyond ten per 100 inhabitants, and may increase the development to a point where as many as fifteen telephones will be introduced to that number of inhabitants. Charts Nos. 4, 5 and 6 illustrate the way in which the telephone development has heretofore increased as the price of service has fallen. The consideration of the manner of charging must therefore be made with due prevision of the tremendous number of telephones that an operating company will be called on to provide within a few years. It is our belief that the number of telephones in the city of Chicago should exceed 300,000, and perhaps exceed 350,000, when the population of the city is about 3,500,000. Within twenty years, as we have pointed out, 400,000 is too small an estimate of the number that should be in use in the city of Chicago, and the number may exceed 500,000. These estimates are founded on the presumption that a franchise will be granted to a company with conditions requiring adequate service over the entire city.

Our Chart No. 7 shows the way in which the area of the city of Chicago has been growing. The area is given in square miles. Upon the absorption of territory in April, 1899, the total area within the city limits, according to the city statistician, became 190.638 square miles. From 1837 to 1889, the area of the city had a steady increase. In July, 1889, a very large area was added to the city and, since that time, the area has been gradually increasing in a small degree. From 1889 to 1899, ten years, the area of the city had increased practically twenty square miles, which is at the rate of two square miles per annum. If farther addi-

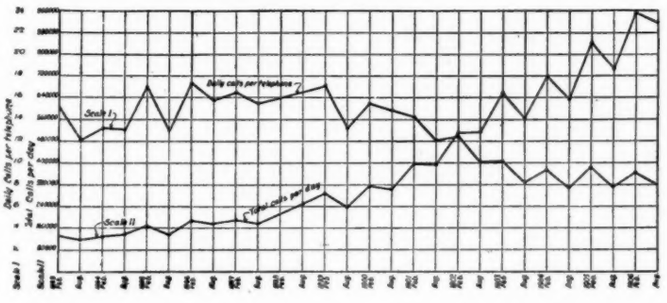


Chart No. 9—Showing the calls per day in the Chicago Exchange district and the number of daily calls per telephone. Chicago has fewer telephones in use than New York, but makes more calls per day.

DATA FOR CHART NO. 9.

Showing the total originating "calls" per day in the "Chicago Exchange" District and the average number of "calls" per telephone per day.

Month.	Year.	Total Originating Calls.	Originating Calls per Telephone.
February,	1893	131,329	15.15
August,	1893	117,889	12.09
February,	1894	123,817	13.12
August,	1894	127,172	13.07
February,	1895	168,295	16.95
August,	1895	135,964	13.00
February,	1896	186,423	17.32
August,	1896	172,213	15.71
February,	1897	188,206	16.40
August,	1897	175,959	15.42
February,	1898	.....	.....
August,	1898	.....	.....
February,	1899	285,468	17.50
August,	1899	239,150	13.28
February,	1900	315,100	15.47
August,	1900	303,465	14.87
February,	1901	419,433	14.22
August,	1901	392,827	12.02
February,	1902	511,033	12.40
August,	1902	515,207	10.03
February,	1903	654,638	10.08
August,	1903	562,365	8.21
February,	1904	715,020	9.38
August,	1904	653,246	7.70
February,	1905	840,053	9.57
August,	1905	759,739	7.85
February,	1906	952,159	9.01
August,	1906	916,622	7.95

tions are made to the area of the city at the latter rate, by the opening of 1929, the area of the city will exceed 225 square miles. That is, it may be expected that the telephone

service will not only become much more widely used within the present city limits, but the city limits may be expected to extend somewhat, and thus require additional considerations in dealing with the subscribers.

The growth of the number of telephones in the city of Chicago is shown by the Chicago curve on chart No. 8, to now be going on at a rate of nearly 30,000 telephones per year, and the development has been going on at an average rate of nearly 20,000 telephones per year for five years. During the next five years we believe that the growth in the number of telephones will go on at the highest rate yet

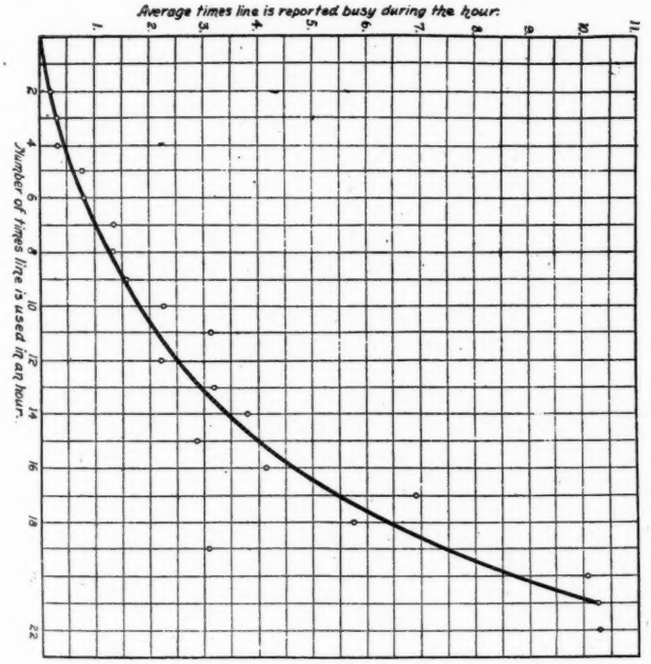


Chart No. 10—Showing record of observations made for the purpose of learning the relation between the number of times a line is used in an hour and the number of times the line is reported busy during the hour.

DATA FOR CHART NO. 10.

Record of observations made for the purpose of learning the relation between the number of times a line is used in an hour and the number of times the line is reported busy during the same hour.

Messages in an Hour. Out and In.	Number of Observations.	Number of Times Line Reported Busy.	Average Number of Times Line Reported Busy.
1	...	...	.....
2	256	48	.19
3	251	75	.30
4	258	80	.31
5	276	209	.76
6	246	197	.80
7	251	341	1.36
8	184	246	1.34
9	148	236	1.59
10	114	259	2.27
11	114	356	3.12
12	89	197	2.21
13	59	188	3.19
14	58	220	3.80
15	54	156	2.87
16	41	170	4.15
17	28	193	6.90
18	28	161	5.75
19	25	77	3.08
20	13	131	10.08
21	16	164	10.25
22	11	113	10.28

attained and perhaps the rate will increase, provided the service can be made sufficiently inexpensive for the smaller users, and the quality of the service can be maintained or improved.

Our chart No. 9 indicates the way in which the total number of calls emanating from the telephones in the Chicago exchange district has increased steadily since 1893. For the purpose of this and following charts, a call is counted each time a subscriber takes his telephone receiver from the hook and his signal is answered by an operator. With this increase in the number of calls there has been a corresponding increase in the cost of handling the traffic, and the only way immediately open for reducing the expenses is to bring about a reduction in the number of calls. As the number of telephones increases, the calls will increase at a more rapid rate unless every reasonable effort is

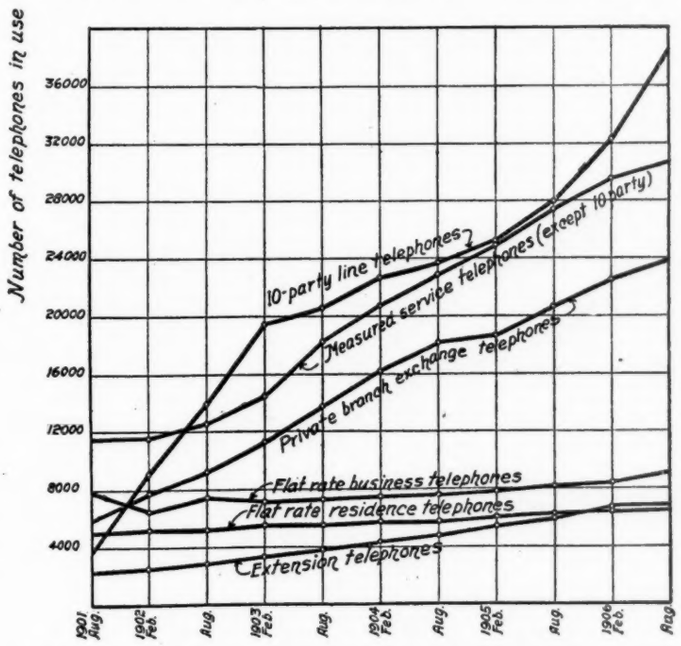


Chart No. 11—Showing the growth of the different classes of service in the Chicago Exchange district, that is, excluding the neighborhood exchange telephones which aggregated 8,570 on January 1, 1907. Taken from records of Auditor of the Chicago Telephone Company.

DATA FOR CHART NO. 11.

Showing the growth of the different classes of service in the "Chicago Exchange" District; that is, excluding the "Neighborhood" Exchange telephones, which aggregated 8,570 on January 1, 1907.

		Private Branch Exchange Telephones.	Flat Rate Business Telephones.	Flat Rate Residence Telephones.	Measured Service Telephones (Except Ten-Party Line Telephones.)	Ten-Party Line Telephones.	Extension Telephones.
August,	1901.	4,246	6,769	4,922	10,564	3,848	2,379
February,	1902.	6,385	6,755	5,240	11,406	8,912	2,534
August,	1902.	8,014	7,440	5,205	12,556	13,989	2,914
February,	1903.	10,562	7,049	5,526	14,983	19,128	3,340
August,	1903.	13,408	7,291	5,529	18,220	20,167	3,893
February,	1904.	15,475	7,461	5,736	20,872	22,299	4,375
August,	1904.	17,445	7,596	5,764	22,950	23,568	4,894
February,	1905.	18,643	7,801	6,096	24,916	25,107	5,284
August,	1905.	20,736	8,183	6,113	27,216	27,959	6,053
February,	1906.	22,550	8,393	6,509	29,538	32,216	6,655
August,	1906.	23,942	9,163	6,511	30,657	38,461	6,693

put forth to prevent useless and frivolous calls from the telephones. Of the total number of calls each week day, which at present average nearly a million in the Chicago telephone exchange district, about one-third of the traffic as now handled constitute unavailing calls, that is, calls which are made by subscribers but prove to be futile efforts and do

not mature into messages because the line called for is found to be busy or the called for subscriber fails to answer or any of the various other fertile reasons for the failure of a call to be completed into a message. Each of these calls means cost for the operations performed. To bring about good and cheap telephone service it is necessary to reduce these unavailing calls to the lowest possible number, and especially to reduce the frequency with which called for lines are found to be busy. Such "busy reports"

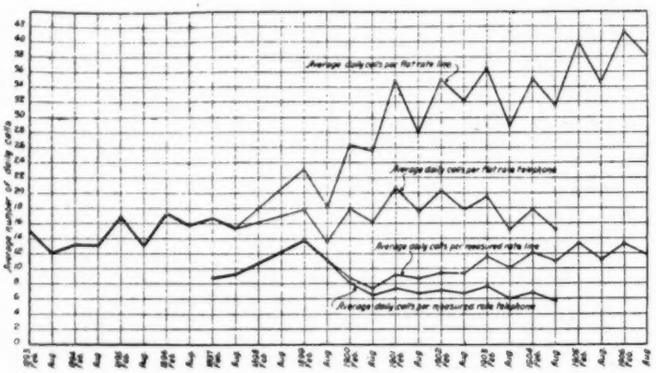


Chart No. 12—Showing the average numbers of daily calls per line and per telephone on flat rate lines and measured rate lines in Chicago exchange district, excluding 10-party telephones.

DATA FOR CHART NO. 12.

Showing the average number of daily "calls" per line and per telephone on flat rate lines and measured rate lines in "Chicago Exchange" District, excluding ten-party telephones.

Month.	Year.	Average Daily Calls per Measured Rate Line.	Average Daily Calls per Flat Rate Line.	Average Daily Calls per Measured Rate Telephone.	Average Daily Calls per Flat Rate Telephone.
February,	1893.....	.....	15.15	.....	15.1
August,	1893.....	.....	12.09	.....	12.1
February,	1894.....	.....	13.10	.....	13.1
August,	1894.....	.....	13.05	.....	13.0
February,	1895.....	.....	16.90	.....	16.8
August,	1895.....	.....	13.00	.....	13.0
February,	1896.....	.....	17.30	.....	17.3
August,	1896.....	.....	15.70	.....	15.7
February,	1897.....	8.75	16.75	8.75	16.7
August,	1897.....	9.16	15.44	9.16	15.4
February,	1898.....	.....	.....	.....	....
August,	1898.....	.....	.....	.....	....
February,	1899.....	13.85	23.1	13.80	17.8
August,	1899.....	11.10	18.05	11.10	13.5
February,	1900.....	8.70	26.3	8.15	17.9
August,	1900.....	7.35	25.6	6.53	16.2
February,	1901.....	9.18	34.9	7.42	20.6
August,	1901.....	8.71	28.0	6.73	17.5
February,	1902.....	9.40	35.0	7.10	20.3
August,	1902.....	9.35	32.1	6.73	17.8
February,	1903.....	11.50	36.5	7.60	19.5
August,	1903.....	10.10	28.9	6.03	15.1
February,	1904.....	12.10	35.1	6.82	17.8
August,	1904.....	10.90	31.5	5.80	15.1
February,	1905.....	13.40	40.0	.....	....
August,	1905.....	11.20	34.6	.....	....
February,	1906.....	13.30	41.4	.....	....
August,	1906.....	11.80	38.0	.....	....

now constitute in Chicago about one-half of the total unavailing calls and are in excessively large numbers, averaging about sixteen per cent of the total number of calls, which is in a large degree due to the tremendous use of the telephones under the flat rate now prevailing. It is obvious from our examination that the Chicago telephone service is burdened by an expensive and undesirable parasite of useless telephone calls which must be removed before the service can be made the most satisfactory and the price of the service can be reduced to a minimum.

The frivolous and useless messages can be largely cut off by making measured rates of service, since even a small charge per message becomes a marked deterrent to the needless use of the telephone. This is illustrated by the line representing the average number of daily calls made from each telephone, shown on our chart No. 9. The number of telephones has been steadily increasing in Chicago, and the total number of telephone calls per day has also been steadily increasing, but the average number of daily calls emanating from the individual telephones began to decrease in 1899 and has decreased from an average approximating sixteen calls per telephone per day to an average approximating nine calls per telephone per day. The

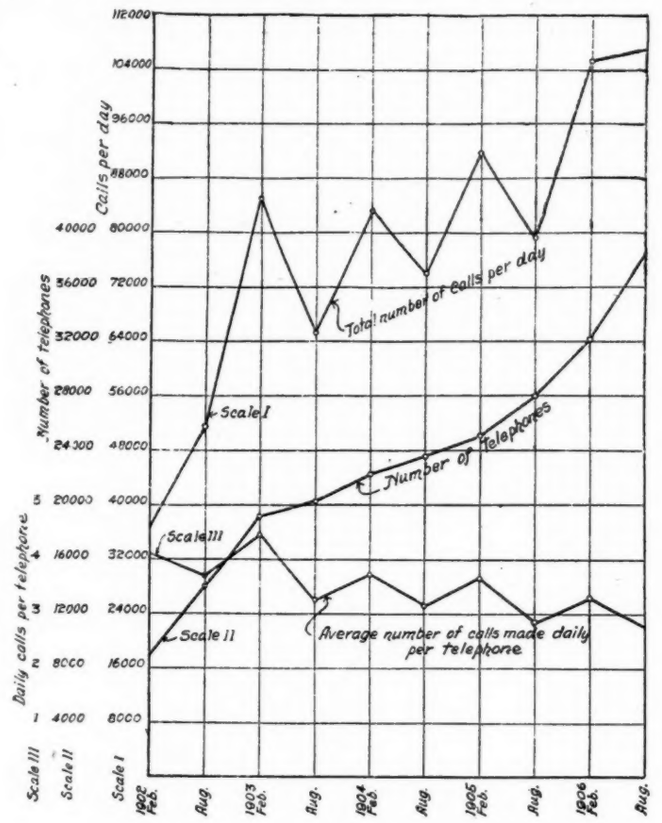


Chart No. 13—Showing the number of 10-party telephones, the number of calls per day originating from 10-party telephones, and the average number of calls made daily per telephone.

DATA FOR CHART NO. 13.

Showing the number of ten-party telephones, the total number of "calls" per day originating from ten-party telephones, and the average number of "calls" made daily per telephone.

Month.	Year.	Total Number of Calls. per Day.	Number of Telephones.	Average Number of Daily Calls per Telephone.
February,	1902.....	36,599	8,912	4.11
August,	1902.....	51,725	13,989	3.70
February,	1903.....	85,399	19,128	4.46
August,	1903.....	65,193	20,167	3.24
February,	1904.....	82,981	22,299	3.71
August,	1904.....	73,947	23,568	3.13
February,	1905.....	91,753	25,107	3.65
August,	1905.....	79,364	27,959	2.84
February,	1906.....	105,521	32,216	3.28
August,	1906.....	106,847	38,461	2.77

time that this decrease began is concurrent with the introduction of measured rates, and during the four years while the measured rates were coming into vogue the average daily calls per telephone in the city were steadily decreas-

ing until they have now reached an apparently fixed value that is determined to a considerable degree by the remaining flat rate telephones which involve an over use of the lines.

In these charts it will be observed that a point is marked on each of the curves for the months of February and August of each year, with the exception of the year 1898, during which no records were kept by the Chicago Telephone Company. These points were fixed by what are called "peg counts," taken on one day in August and one day in February to determine the total number of calls

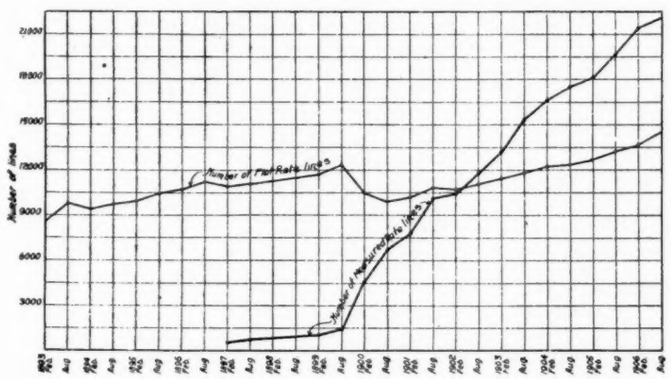


Chart No. 14—Showing the numbers of flat rate lines, including commutation trunk lines connected with private branch exchanges, and measured rate lines in Chicago Exchange district, excluding 10-party lines.

DATA FOR CHART NO. 14.

Showing the numbers of flat rate lines (including commutation trunk lines connected with private branch exchanges) and measured rate lines in "Chicago Exchange" District, excluding ten-party lines.

Month.	Year.	Number of Flat Rate Lines.	Number of Measured Rate Lines.
February,	1893	8,679	.....
August,	1893	9,751	.....
February,	1894	9,443	.....
August,	1894	9,744	.....
February,	1895	9,980	.....
August,	1895	10,467	.....
February,	1896	10,777	.....
August,	1896	11,291	.....
February,	1897	10,958	521
August,	1897	11,000	654
February,	1898	.....	.....
August,	1898	.....	.....
February,	1899	11,733	1,046
August,	1899	12,359	1,458
February,	1900	10,429	4,581
August,	1900	9,967	6,679
February,	1901	10,247	7,812
August,	1901	10,879	10,119
February,	1902	10,761	10,466
August,	1902	11,019	11,799
February,	1903	11,442	13,190
August,	1903	11,879	15,306
February,	1904	12,250	16,668
August,	1904	12,336	17,406
February,	1905	12,657	18,063
August,	1905	13,209	19,669
February,	1906	13,599	21,352
August,	1906	14,482	22,012

coming into the exchange. The counts are made by each operator keeping a record on some counting device of the aggregate number of calls coming to her position during her hours of service, and the total number thus given are plotted on our chart No. 9. The average daily calls per telephone are derived by dividing the total number of calls per day upon each of the dates of the "peg counts" by the number of telephones then in use in the city. It will be observed that the zigzag lines representing total calls per day and average daily calls per telephone rise and fall. ordinarily being higher in each February than either of the points corresponding to adjacent Augusts. This is because the telephone business in Chicago is larger in February than in August, since February is a month of great business activity and August is a month during which the business activity is reduced.

It must be borne in mind that in all these charts giving the total calls per day and the total calls per telephone, the data relate to "peg count" calls, which include all of the unavailing calls in addition to those which have become messages, and that approximately one-third of the daily calls in the city of Chicago are unavailing, one-half of the unavailing calls being caused by the overuse of lines which are reported busy.

Chart No. 10 shows a record of observations made for the purpose of learning the relation between the number of times a line is used in an hour and the number of times the line is reported busy during the hour. By the phrase, the number of times a line is used in an hour, we mean the number of actual messages, outgoing and incoming, which

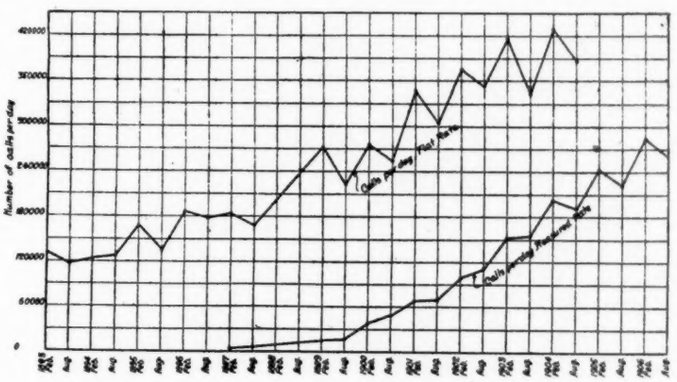


Chart No. 15—Showing the numbers of calls per day originating from flat rate telephones and from measured rate telephones in Chicago exchange district, excluding 10-party telephones.

DATA FOR CHART NO. 15.

Showing the total numbers of "calls" per day originating from flat rate telephones and from measured rate telephones in "Chicago Exchange" District, excluding ten-party telephones.

Month.	Year.	Calls per Day, Measured Rate.	Calls per Day, Flat Rate.
February,	1893	.....	131,329
August,	1893	.....	117,889
February,	1894	.....	123,817
August,	1894	.....	127,172
February,	1895	.....	168,295
August,	1895	.....	135,964
February,	1896	.....	186,423
August,	1896	.....	177,213
February,	1897	4,554	183,652
August,	1897	5,996	169,963
February,	1898	.....	.....
August,	1898	.....	.....
February,	1899	14,478	270,990
August,	1899	16,179	222,971
February,	1900	39,837	275,263
August,	1900	49,082	254,383
February,	1901	68,037	347,573
August,	1901	69,835	304,576
February,	1902	98,383	376,051
August,	1902	110,109	353,373
February,	1903	152,126	417,113
August,	1903	154,646	342,526
February,	1904	202,506	429,523
August,	1904	190,724	388,575
February,	1905	242,556	.....
August,	1905	220,570	.....
February,	1906	283,475	.....
August,	1906	260,299	.....

pass over the line in an hour. Chart No. 10 is plotted from data collected by the Chicago Telephone Company through a special observer, who kept up a series of careful observations on several hundred lines. The data observed have been plotted, using the number of messages

passing over the line, that is, the number of times the line was used in an hour, on the horizontal axis and the number of times during the hour the line was reported busy on the vertical axis. Each circle laid down on the plat represents the averages of a number of observations as shown in the table accompanying this chart and the observations represent data derived from numerous lines, so that the points may be assumed to be fairly accurate in representing the facts. The circles represent the average data obtained, and

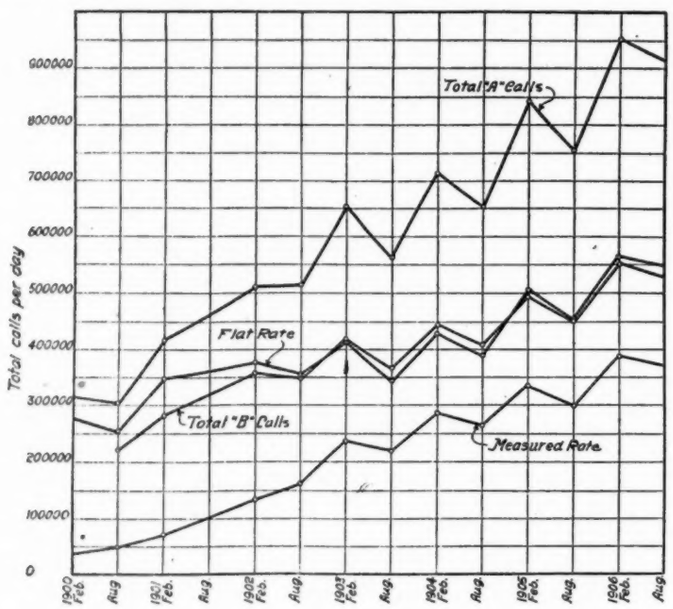


Chart No. 16—Showing the way in which trunked calls ("B" calls) increase as the service extends.

DATA FOR CHART NO. 16.

Showing the way in which trunked calls ("B" Calls) increase as the service extends.

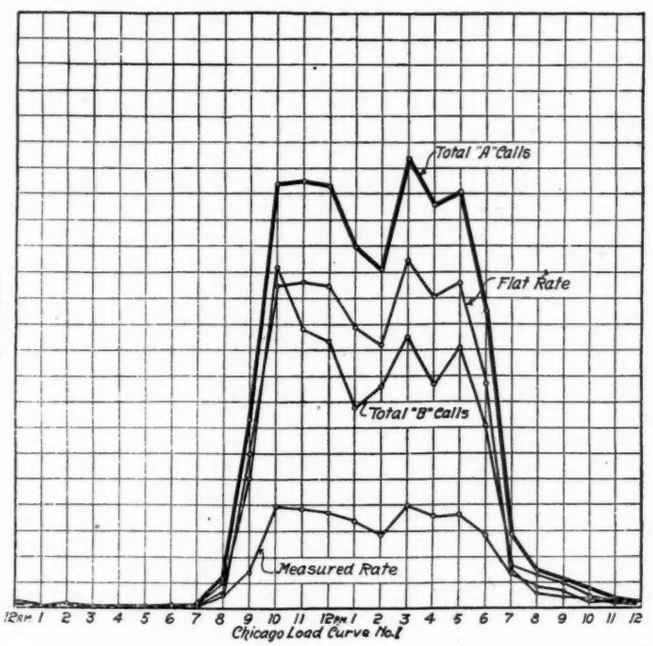
	Total Originating Calls.	Total Flat Rate Calls.	Total "B" Calls.	Total Measured Rate Calls.
February, 1900	315,100	275,263	.....	39,837
August, 1900	303,465	254,383	220,913	49,082
February, 1901	419,433	347,573	280,666	71,860
August, 1901	.....	.....	.....	.....
February, 1902	511,033	376,051	358,544	134,982
August, 1902	515,207	353,373	352,311	161,834
February, 1903	654,638	417,113	417,240	237,525
August, 1903	562,365	342,526	367,201	218,839
February, 1904	715,020	429,533	442,579	285,487
August, 1904	653,246	388,575	408,614	264,671
February, 1905	740,053	505,744	493,108	334,309
August, 1905	759,739	456,805	452,778	299,934
February, 1906	952,159	563,163	552,751	388,996
August, 1906	916,622	549,476	528,986	367,146

we have drawn a curved line to represent the average of the positions of the circles. It will be observed from this curve on the chart that if a line is used eleven times an hour it may be expected to be reported busy at least twice during the hour to calling subscribers who desire to communicate with that line; but if it is used twenty-one times an hour it may be expected to be reported busy not less than ten times. This plainly shows that the unavailing calls increase in a tremendous ratio as the load on a telephone line increases.

Our chart No. 10 is based upon the number of times a line is used in an hour, but we will point out here that almost all lines that are used in flat rate service are very much busier during one hour of the day than during any other hour of the day; that is, a large proportion of the total calls over a telephone line during a day are made within certain specific "busy" hours, which makes the busy reports much more numerous during certain parts of the day than the average number of calls might indicate.

Chart No. 11 shows the growth since August, 1901, of the different classes of service in the Chicago exchange district (that is, excluding the neighborhood exchange telephones). It will be observed that during this period ten-party line telephones, which are nickel prepayment telephones, and therefore belong to the measured rate class, and the other measured rate telephones, have increased steadily. The private branch exchange telephones have also increased, and a considerable portion of these also belong in the measured rate classification. The flat rate business and residence telephones have not increased in a large degree. We were not able to obtain the actual data for the two preceding years, but the measured rate service was proportionately increasing during those years, it having been first introduced about 1899; and our chart No. 9 shows that during these years' increase of the measured rate service, from 1899 to 1906, the average number of calls per telephone per day has consistently decreased. This has helped to make it possible for the Chicago Telephone Company to steadily decrease the average charges per telephone within the Chicago exchange district. That such a decrease has occurred is plainly to be observed from our chart No. 4, which shows two curves, one indicating the average number of telephones in use in Chicago during each year from 1897 to 1906, which is indicated by a rising line from left to right as the dates advance, and another curve showing the average rate paid per telephone during the year, which is indicated by the falling line as the dates advance. The average rate paid in 1897 was $123.53, as indicated on the chart, and it has fallen year by year since, until it has now become as low as $53.29. The figures on this chart do not include "neighborhood" telephones.

With continued careful management, improved methods of keeping records for the determination of the costs of the different classes of service, and a greater extension of the measured rate service we believe that the Chicago Telephone Company, in case it should be granted a franchise, can continue this decrease in the average yearly rate that the subscribers pay per telephone, until the average yearly rate


Total "A" Calls
Flat Rate
Total "B" Calls
Measured Rate
Calls per hour
12 Noon 1 2 3 4 5 6 7 8 9 10 11 12 Noon 1 2 3 4 5 6 7 8 9 10 11 12
Chicago Load Curve No. 1

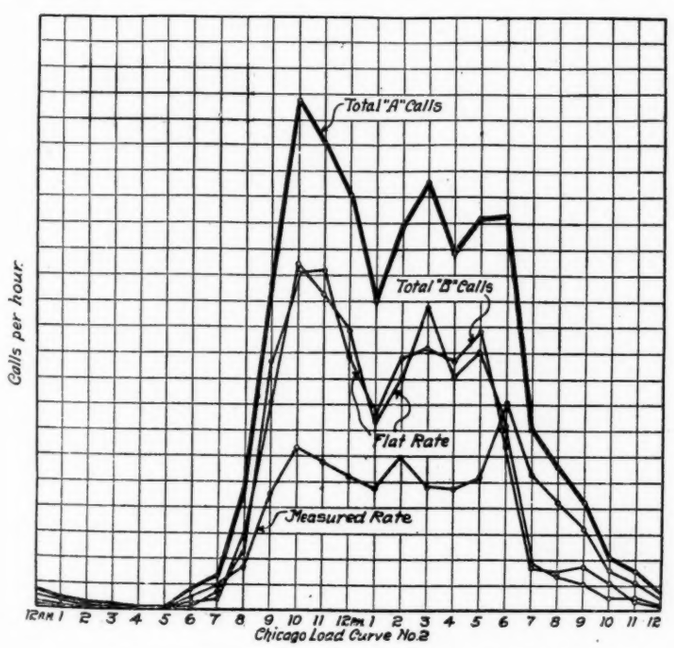
Calls per hour Harrison exchange, August 3, 1906.

does not exceed forty dollars, or perhaps less, and a large proportion of the telephones will be paying not more than eighteen dollars per year. On the other hand, our study of the problem convinces us that an extension of the flat rate telephone service would tend to so greatly increase

the useless calls over the telephones, and so overload the lines, that the unavailing calls would increase tremendously, making the daily calls per telephone even larger than they were in 1906, and thus increase the annual expense of the service so largely that the average price per telephone would be given a tendency to rise instead of fall.

It is a tradition in telephone circles that the service per telephone costs more as the number of telephones connected with the plant increases. As the number of telephones increases, each subscriber has the opportunity to call upon more people by telephone, and the law of averages would indicate that the number of calls per day from each telephone should increase, thus making the service more expensive to the operating company, provided the service is a flat rate service and unnecessary use of the telephone is not deterred by a measured rate charge. This condition seems to have worked out in practice, according to the statements of telephone companies at Cleveland, Indianapolis and elsewhere, and flat rate service seems to increase in cost per telephone as the number of telephones attached to a system increases.

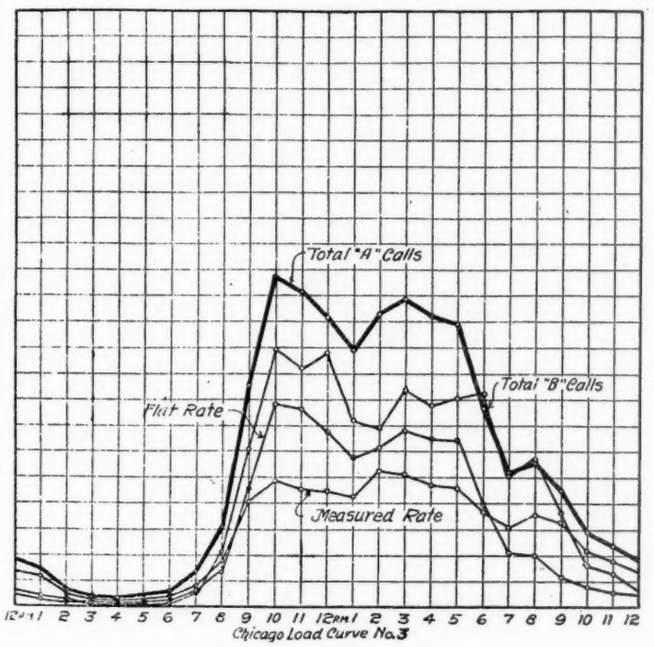
On the other hand, a different condition exists in connection with measured rate service. With the measured rate service the message is the unit instead of the rental of the instrument; and it is the message that the subscriber ought to pay for, because it is for the purpose of sending his messages that he provides himself with a telephone. With measured rate service, and a reasonable use of the telephone lines, the unavailing calls are reduced to a minimum. The number of calls per telephone per day, apparently, are not inclined to increase as the system increases in extent. This is illustrated in our charts Nos. 12 and 13. But the total number of messages handled increases approximately in proportion to the number of telephones. Under these conditions, the ordinary laws regulating the difference between the cost of producing articles in large and small quantities comes into play, and the actual cost per message ought to steadily decrease. Since it is the messages that are paid for under the measured rate system


Total "A" Calls
Total "B" Calls
Flat Rate
Measured Rate
Calls per hour
12AM 1 2 3 4 5 6 7 8 9 10 11 12PM 1 2 3 4 5 6 7 8 9 10 11 12
Chicago Load Curve No.2

Calls per hour Monroe exchange, August 3, 1906.

and the actual cost per message ought to steadily decrease as the system enlarges, the average amount paid by each subscriber will decrease if the subscribers limit the use of their telephones to their actual needs, and the telephone company is well managed.

The difference thus arising between flat rates and measured rates is very marked. The flat rate telephone user tends to increase his number of messages as the system enlarges, so that the average calls per day per telephone may be expected to increase and the proportion of unavailing calls also to increase. The consequence is that the company is forced to handle more calls per telephone as the system becomes larger, and the price per telephone has to


Total "A" Calls
Total "B" Calls
Flat Rate
Measured Rate
Calls per hour
12AM 1 2 3 4 5 6 7 8 9 10 11 12PM 1 2 3 4 5 6 7 8 9 10 11 12
Chicago Load Curve No.3

Calls per hour Calumet exchange, August 3, 1906.

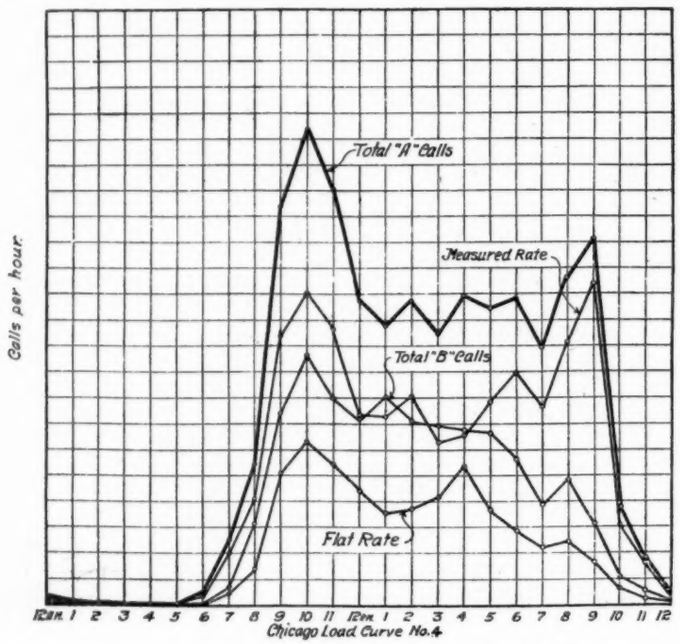
increase under flat rate charges; while the subscribers limit their use of the telephone to their actual needs under measured rates and the number of calls per telephone does not have a tendency to increase as the system increases in size after it has reached a considerable development such as is now found in the city of Chicago. Under these conditions the principle of wholesale production makes it possible for the company to reduce its cost of operating per message and thereby reduce the average price charged the telephone subscribers.

The telephone hanging on the wall appeals to the average telephone subscriber as constituting the total expense to the company through the maintenance of the instrument and lines. The maintenance and the interest on the equipment does constitute a considerable expense to the company, but a great deal of the expense to the company is due to the actual cost of handling each message. This expense composes a large proportion of the annual expenditures of the Chicago Telephone Company.

Moreover, the more calls that are made per line, the larger must be the switchboards provided by the company for making connections for communication between subscribers' lines, since each operating employe can only take care of a limited number of calls per day, and if the number of calls per telephone increases, each operating employe can take care of the requirements of fewer lines. As the operating employes are increased, the switchboards must be increased at large expense to afford additional operator's positions, and all of this increases the annual expense for telephone service. The deterrent of a small charge per message, varying from a nickel downwards depending upon the number of calls used per year, is sufficient to overcome much of this difficulty and to reduce the telephone service to a fairly uniform and business-like basis.

We think that the Chicago Telephone Company has involved itself in considerable unnecessary expense by ap-

parently encouraging its subscribers to make calls upon operators for various items of information. The record of a count made in November, 1906, shows that more than 42,000 requests for the "time of day" were made of the operators on that day. The expense of this service should go far toward keeping the subscribers who asked the time of day supplied with clocks; and various other much repeated enquiries apparently aggregate an equal expense.



Calls per hour Wentworth exchange, August 3, 1906.

In further illustration of the relation of the number of calls made per telephone by different users, we have had some additional charts made from the data which we have gathered together.

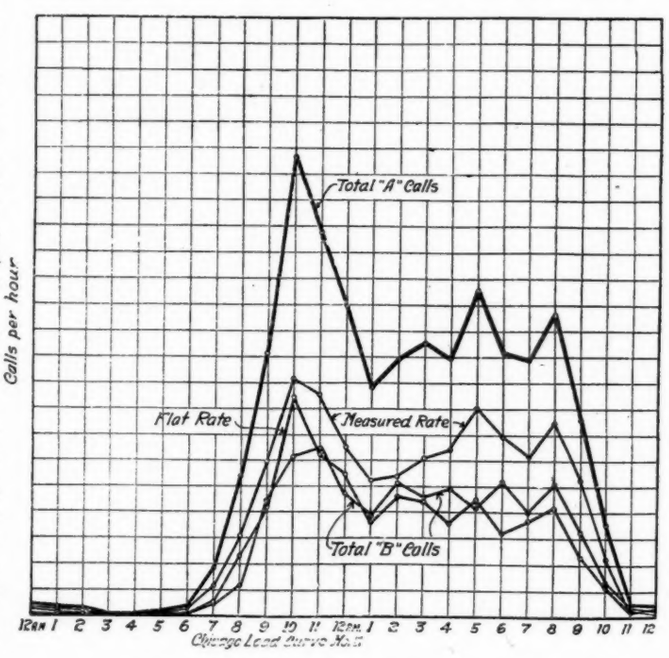
Chart No. 14 shows the number of flat rate lines and the number of measured rate lines in the Chicago exchange district. The flat rate lines include what are known as commutation trunk lines, namely, lines from private branch exchanges which are used for outgoing messages only; and the measured rate lines do not include the ten-party lines, which we have put upon a separate chart (No. 13). It will be observed that the number of measured rate lines is rapidly increasing compared with the number of flat rate lines.

Chart No. 15 shows the total number of calls per day originating from the flat rate telephones and from the measured rate telephones connected with the lines illustrated in chart No. 14.

Chart No. 12 shows the average number of daily calls per line and per telephone on the flat rate lines and on the measured rate lines which are illustrated in chart No. 14, and this chart indicates the large difference which exists between the two kinds of service now current in Chicago in respect to the number of calls per line or per telephone per day. The average number of calls per line on the flat rate lines is steadily increasing, thus increasing the annual expense to the telephone company per line, though the price charged to the flate rate subscribers remains independent of the use of the telephones. The numbers of calls per line and per telephone on the measured rate lines show different characteristics. The number of calls per telephone per day is steadily decreasing toward an apparent minimum limit of approximately six calls per telephone per day, thus decreasing the cost to the telephone company and making it possible to make marked reductions in the average price per telephone.

Chart No. 13 shows the number of ten-party telephones, the total number of calls per day originating from these ten-party telephones, and the average number of calls made daily per telephone. This shows that in this service the number of calls made daily per telephone is remarkably low, and the price of this service may properly be made correspondingly low.

There is another feature which relates to the question of relative use by flat rate and measured rate users of telephones. It is impracticable to connect all telephone subscribers in a great exchange system, such as is found in Chicago, with a single office, and it becomes necessary to arrange means for transferring calls made by the lines in one office to the called-for subscribers' lines in other offices. This is ordinarily denominated "trunking" the calls between the offices, and it involves a double expense for operators, since one operator is required to receive the call of the subscriber at the originating office and another operator is required to complete the connection to the called subscriber's line in the second office. As the system increases in number of telephones, the proportion of "trunked" calls is likely to increase. We have illustrated this in connection with our Chart No. 16, which shows the way in which the "trunked" calls, marked "B calls" on the chart, increase as the service extends. This Chart No. 16 shows the daily number of "B calls" according to the "peg counts" of February and August for a number of years back, and it will be observed that the number of "B calls" consistently increased during this period. This chart also shows the number of measured rate calls originating from subscribers' lines and the number of flat rate calls originating from subscribers' lines, and it will be observed that the number of flat rate calls has increased year by year at a rate approximately equal to the increase of calls from measured rate lines, although our Chart No. 14 shows that the number of flat rate lines has not been increasing as rapidly as the measured rate lines. Chart No. 16 also shows that



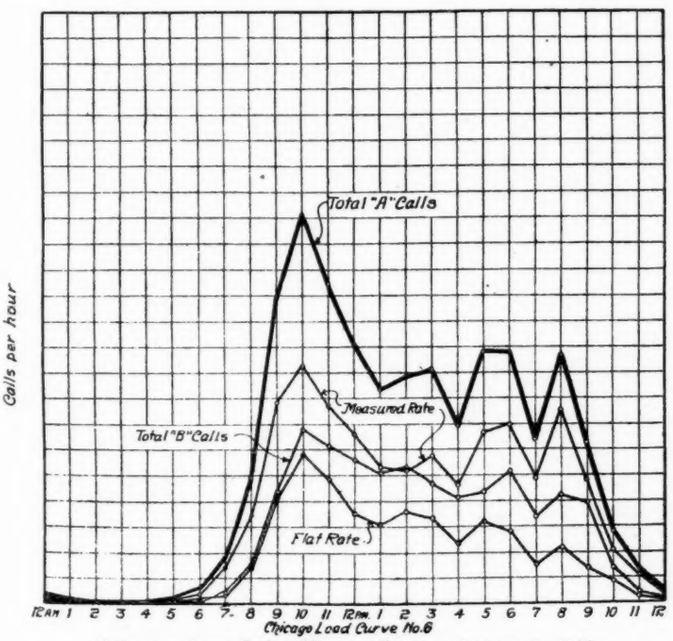
Calls per hour Hyde Park exchange, August 3, 1906.

the rate at which "B calls" or "trunked" calls increase corresponds more nearly to the rate at which the flat rate calls increase in number than to the rate at which the measured rate calls increase in number.

The indications that are afforded by Chart No. 16 are likewise afforded by the series of load curves which we have given. A load curve is a curve showing the number

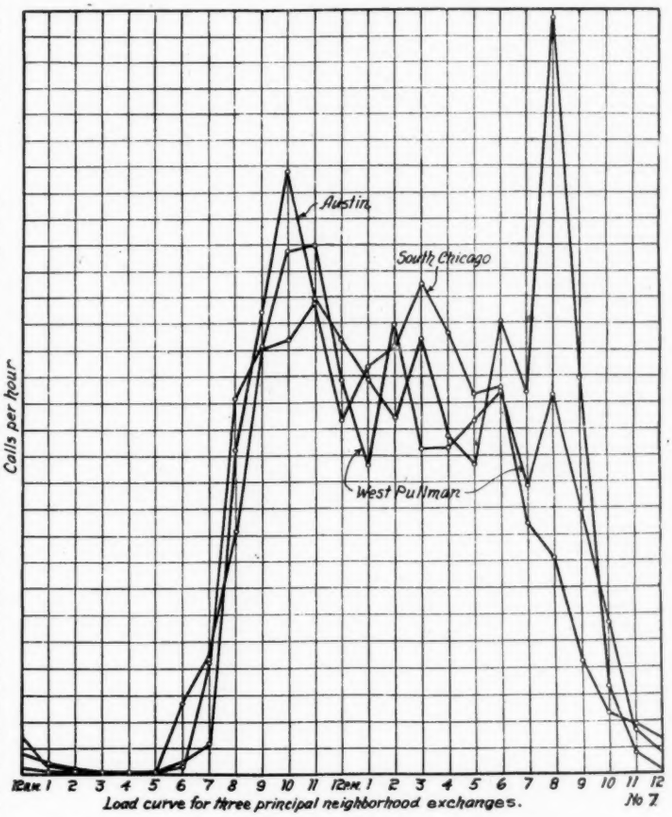
of calls occurring within a telephone exchange during each hour of the day. We have plotted the load curves for the "peg count" taken on August 3, 1906, in all the telephone exchange offices of the city, giving separate curves representing the measured rate calls, the flat rate calls, and the incoming trunked or "B calls" for each exchange. We have also given a line showing the sum of the measured rate and flat rate calls for each exchange on that day. These are indicated by the titles Chicago Load Curves Numbers 1, 2, 3, 4, 5, 6 and 7. We include a number of typical load curves with this report. The Chicago Telephone Company makes a "peg count," as heretofore indicated, once a month, and we have given the load curves for the "peg count" for one month, taken at random, as shown in table No. 8.

Load curve table No. 9 gives the sum of the calls obtained from the several exchange offices in the Chicago exchange district. The curves are shown as the total number of calls originating on all the subscribers' lines (marked "A" calls) on August 3, 1906, during each hour of the day, the total number of measured rate calls during each hour of the day, the total number of flat rate calls during each hour of the day, and the total number of "trunked" or "B" calls coming in to all of the exchange offices during each hour of the day. A point on each of these curves indicates the number of calls of the particular class during the corresponding hour of the day. The indication of "B" calls on the load curves for the several separate exchange offices, does not afford any means of telling from what sort of a line the original calls emanated, because records of the trunked calls are only made at the receiving office, while the sending office (where the "B" call is not recorded) is the only one which could determine from what sort of a line a trunked call emanates. But the total load curve makes it possible to compare the total trunked calls with the total flat rate and the total message rate calls, and it will be observed that the number of trunked calls corresponds closely to the number of flat rate calls. This is probably an indication that the greater proportion of the trunked calls come from the flat rate lines, and that these lines are consequently causing more than a proportional share of the double expense of the trunked calls. We have studied this question from the records of the Chicago Telephone Company extending back over the period since the introduction of message rates in Chicago, and in each year find a similar indication, namely, that the trunked calls correspond more closely to the flat rate calls, and that the flat rate lines apparently therefore should be properly charged with the larger proportion of the expense of the trunking service and maintaining the trunking plant.


Total "A" Calls
Measured Rate
Total "B" Calls
Flat Rate
Calls per hour
12 AM 1 2 3 4 5 6 7 8 9 10 11 12 PM 1 2 3 4 5 6 7 8 9 10 11 12
Chicago Load Curve No. 6

Calls per hour Lake View exchange, August 3, 1906.

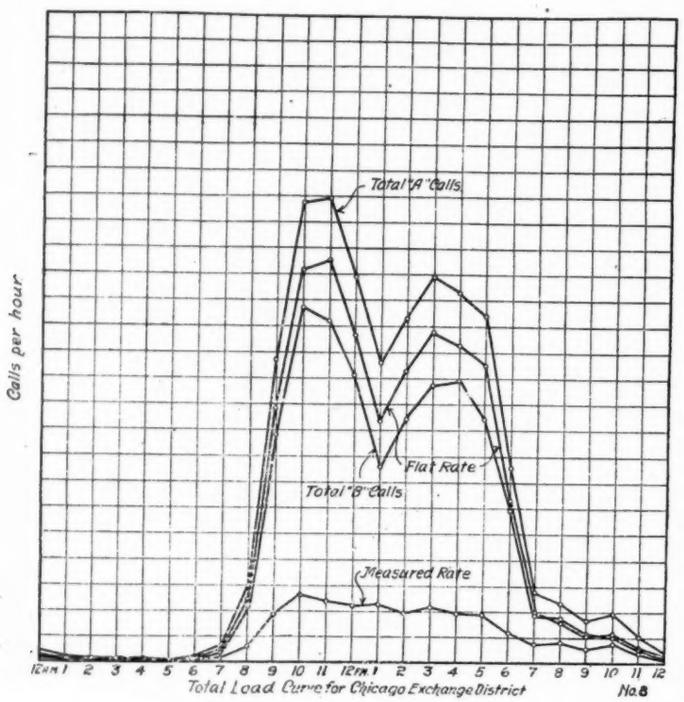
In passing, we will call attention to the complexity of the service indicated by these load curves. It will be noticed that the load curve for Harrison exchange, which is in the business portion of the city, and is typical of the load curves at Main, Central and Harrison exchanges, shows extended peaks of traffic; that is, it shows a very large number of calls at a particular hour, about eleven o'clock in the morning, and that business falls off rapidly on either side of the peak. There is another peak in the afternoon in each of these exchanges. In the exchanges like Wentworth, Hyde Park, Douglas and Lake View, there comes a relatively high peak between seven and nine o'clock in the evening, apparently due to the demands of social intercourse between the families of subscribers.


Austin
South Chicago
West Pullman
Calls per hour
12 AM 1 2 3 4 5 6 7 8 9 10 11 12 PM 1 2 3 4 5 6 7 8 9 10 11 12
Load curve for three principal neighborhood exchanges.
No 7

Calls per hour Austin, South Chicago, West Pullman exchanges, August 3, 1906.

These great variations in the hourly use of the telephone increase in a marked degree the cost per message for operating, because the telephone company must always have sufficient operators on hand to meet the requirements of the hour, and must have a sufficiently large switchboard to enable it to handle all the calls which arrive at the busiest hour. Even with the best arranged schedule for the operators' work, it is impracticable to arrange for operators to be on hand for only one or two hours in the morning and one or two hours in the afternoon, but the operators must be put at work for a considerable number of hours at a time, so that the irregularities of the load curves which run up into high peaks increase the cost of operating on account of increasing the average number of operators that must be kept on duty in proportion to the total number of calls per day, and also increase the cost for interest and maintenance on account of the extra switchboard positions required to enable these extra operators to perform their work.

A scrutiny of the load curves of the various exchange offices and especially of the business offices, indicates that the greatest proportion of the peak of the load in each exchange office comes from the flat rate users, and that the measured rate curve is more uniform over the period of the day. This absence of peak makes it possible to perform the


Total "A" Calls
Flat Rate
Total "B" Calls
Measured Rate
Calls per hour
12AM 1 2 3 4 5 6 7 8 9 10 11 12PM 1 2 3 4 5 6 7 8 9 10 11 12
Total Load Curve for Chicago Exchange District
No.8

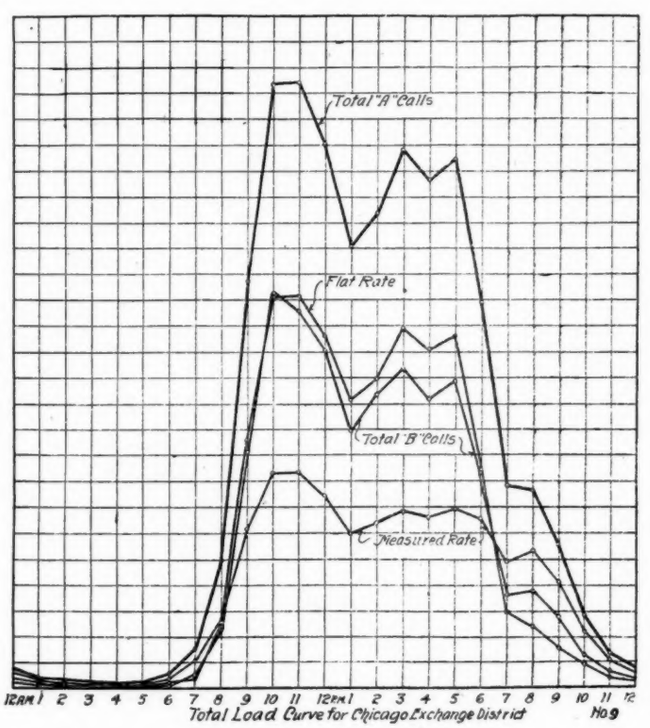
Load curve for the entire Chicago exchange district for August, 1900.

telephone service more economically, and the present measured rate users are therefore less expensive users to whom to supply service. A measure of the expense of the operating is to some degree indicated by the ratio of the maximum number of calls in the busy hour to the total number of calls per day in the exchange. This ratio is larger for the flat rate calls than for the measured rate calls in the Chicago exchange district. As shown by the twelve "peg counts" for 1906 the average ratio for the total number of originating calls is .1072, the ratio for the flat rate calls is .1185, and the ratio for all measured rate calls, including ten-party lines, is .0991, which indicates that the cost of operating for the measured rate calls is less than the cost of operating for the flat rate calls. Other peg counts show similar results.

Service inspection tests from the New York City exchanges, which are operated almost entirely on the measured service basis, show that the proportion of unavailing calls there is only about one-sixth of the total calls, and that the proportion of calls receiving busy reports is one-twelfth of the total calls. A comparison of peg counts for these two exchange systems indicates that the expense for traffic employes per station is lower in New York than in Chicago, and we conclude that this difference must be due to the measured rate method of charging for service.

We have pointed out earlier, certain cogent reasons why the line of the average flat rate subscriber costs the telephone company, as a rule, more than the line of the average measured rate subscriber, largely on account of the overloading of the lines and the increase of the unavailing calls by the flat rate subscribers' use; and the foregoing study of the load curves indicates further that the way in which the calls become distributed in the system makes it possible for the telephone company to arrange its operating force more economically to take care of its present measured rate service, and therefore actually enables the telephone company to make the cost of operating less per individual call of the measured rate service than it can for the flat rate service.

On the flat rate basis the telephone subscriber who makes calls over his telephone line twenty or more times per day (perhaps even fifty or one hundred or more times) pays the same price as the subscriber who uses his telephone only eight or ten times a day, and the flat rate being an average rate which enables the telephone company to come out at the end of the year with its expenses all paid and a balance to pay interest on its investment, it is obvious that the small user pays more for his telephone than his use makes necessary and the largest user pay less for his telephone than his service probably costs the operating company. This is so manifestly unfair that there can be no justification in maintaining a strictly flat rate telephone charge in large cities, with the present known method of operating. Such charges for telephone service are as unjust as similar charges would be if made for electric light or gas. It will be recognized as absurd to suggest that a gas company should charge a fixed rate per year for each gas burner in a place of business, regardless of the number of hours that the place of business is open. The differences between the amount of gas used per burner in a store that closes at 5:30 p. m., and in a saloon which closes at midnight, or between an office which is on an upper floor of some well appointed and well lighted office building, and a shipping room which is in the basement of the same building, are so great that it is manifest that this flat rate method of charging would exercise the utmost injustice between customers—affording a long hour user a large amount of gas at a price which might not pay the company for the expense of the manufacture thereof, while the short hour user, paying the same price per burner, would be paying an extremely excessive price per cubic foot for the gas in order


Total "A" Calls
Flat Rate
Total "B" Calls
Measured Rate
Calls per hour
12AM 1 2 3 4 5 6 7 8 9 10 11 12PM 1 2 3 4 5 6 7 8 9 10 11 12
Total Load Curve for Chicago Exchange District
No.9

Calls per hour Chicago exchange district, August 3, 1906.

that the losses entailed by the long hour user should be recouped to the company. This method of charging was in vogue by electric light companies in the earlier days of electric lighting, before electric meters were reasonably perfected. It was then usual to charge business houses a fixed

rate per incandescent lamp installed and connected to the lines, and residences a different and smaller rate per incandescent lamp installed, the assumption being that the residence would use the lights for fewer hours per day. This method of charging brought many electric light companies to the verge of bankruptcy, and as long as it was in vogue electric lighting remained a luxury. With the advent of charges for actual consumption (that is, measured rates), electric light came within the reach of the greater proportion of people who now use it, and the expansion of the electric lighting service was brought to a reasonable mark.

The meter question is one which creates some difficulty in the telephone field. Nickel prepayment telephone boxes provide for a large number of users. There are now in Chicago over 68,000 nickel prepayment telephones, and the number is apparently steadily increasing. In New York City the measured rate lines are individually equipped with meters in the exchange offices, and the Chicago Telephone Company has developed a meter which makes it impossible to register more than a single unit for each message over the line. We believe that this meter used in connection with the measured service lines that are not equipped with prepayment boxes will prove accurate and satisfactory, in case the city council grants the Chicago Telephone Company a franchise. This meter is arranged in such a manner that no record can be made until the connection with the subscriber's line has been set up in the manner required for making a communication. Thereupon the operator by pushing a button may cause the meter to register one unit, and however many times the button may be pushed thereafter, through oversight or malice of the operator, no additional messages will register on the meter until the connection has been taken down after the completion of the message and a new connection has been made, as upon receiving another call from the subscriber. This guards against an excess number of calls being registered against any subscriber through an oversight on the part of the operator. We see no reason why this meter arrangement should not prove commercially accurate and satisfactory, and we recommend its adoption for the instances of metered lines in case the Chicago Telephone Company should be granted a franchise.

We have allotted a great deal of time to the study of this question of rates and are convinced that the general use of measured rates results in improvement in the service by the reduction of unavailing calls and also results in the reduction of the average cost to the consumers through the elimination of useless calls from the various stations, and makes it possible to place the lowest rate for the least expensive service within the means of the largest possible number of people. We are also convinced that the general adoption of measured rate service will bring about a more uniform rate of calling during the day, which will make it possible to ultimately reduce the price per message, thus bringing about a further reduction in the average cost of telephone service, and especially a reduction to the large class of users which subscribe for telephones of the lowest cost.

A partial application of flat rates is practicable in connection with business telephones which have sufficient service to make it worth while to set aside a special line or lines for outgoing calls only, since such lines do not interfere with the convenience of others, and do not cause a piling up of unavailing calls, because their busy state in no wise affects calls coming from other lines. Such flat rate outgoing service lines must in each instance be accompanied by a sufficient number of incoming lines, to be furnished at a relatively small rental. A partial application of flat rate service may also be applied in connection with residence telephones and with neighborhood exchange telephones, and is here justified because the restricted character or restricted circle of use makes the average calling rate per telephone relatively small and approximately equal for all users of the same class. In connection with residences this use of flat rates in a large city has some serious disadvantages, but its advantages probably overcome the disadvantages.

We gave some consideration to the telephone rates and grades of service in foreign countries, but found no basis for useful comparisons. The London telephone system is the only one comparable in size with the service given in Chicago, and it has only recently been brought to comparable magnitude. The measured rate seems to be there preferred by the engineers. The service in Paris and Berlin is notably bad and the number of telephones few. In some of the smaller foreign cities the service is apparently good, but good foreign service does not partake of the speed and accuracy demanded by American telephone subscribers. The slower speeds reduce costs; zone charges are commonly used, and the wages of employes are lower; and it is impossible to make an intelligent analytical comparison of the foreign with American rates.

TELEPHONE IN HER HAIR.

The use of the telephone has become so universal that it is apt to be credited with playing a part in nearly everything. It is expected to cure many evils and is also often charged with participation in matters of a decidedly peculiar nature. An instance is related by a Kansas City paper:

"John Hayes, chief of police, received a letter this morning from The Lady Citizens of Topeka. The letter said that they wanted to inform him of a mind-reading show that is headed this way. It told all about how the minds are read.

"The advance man comes to your town," the letter says, "and he looks up everyone in the telephone directory. Then he finds out all about them. When the show is pulled off there are a lot of tablets passed around among the audience for the persons to write their life histories on. Then they hand the tablet to a man who passes through the audience. About four sheets under where the person write there is another sheet covered with paraffine. This is taken to a dressing room and rubbed with carbon paper. Then it is readable. There is a small telephone from the dressing room to the woman who reads minds. She is standing in the center of the stage. The earpiece of the telephone is concealed under her hair. Then the life histories are telephoned to her from the dressing room."

"'I wouldn't like to be that advance man,' the chief said after reading the letter. 'That must be a nice job, looking up everyone in town.'"

TESTIMONY FOR THE TELEPHONE.

Always hereafter will Mrs. Jennie Buck, wife of a Montgomery farmer, and her friends be loud in their praise of the telephone. The fact that one of these instruments was accessible at her home saved Mrs. Buck's life, as alone and her clothing burning and the house on fire, she was able to call for help, which came in the person of a neighbor's daughter, who answered the alarm call on the telephone. This use of the telephone adds effective testimony to its convenience and importance as a part of a home's equipment. Over and over again is a telephone used to summon help to fight fires, and in this respect alone to scores of farmers have telephones proven a profitable investment. In the matter of summoning physicians and the hours of time saved in thus securing their service, telephones have in countless cases been the means of saving life. More and more do telephones in rural districts, as well as in the towns and cities, prove their serviceability in times of dire need.

OHIO TELEPHONE CONVENTION

State Association of Buckeye Independents Held a Successful Meeting at Columbus

By H. S. Cranfield

ONE of the most enthusiastic, interesting and helpful conventions ever held by the Ohio Independent Telephone Association was the 1907 meeting which convened at Columbus, O., March 28. Although it was a one-day event every minute of the time was profitably employed and the delegates agreed that it formed an important chapter in the history of the Buckeye state organization. Every one of the counties, excepting Hamilton—which contains Cincinnati—was represented by official delegates. There were visitors present from Independent companies in Hamilton county, but not as regularly accredited delegates from a county organization.

The convention met at the Hartman hotel. Frank L. Beam, president of the Ohio association, called the delegates to order and introduced Mayor Dewitt C. Badger, who welcomed the visiting telephone men to Columbus in a fitting address. Dwight E. Sapp of Mt. Vernon responded on behalf of the association, and in his remarks called attention to the wonderful progress made by the Independent movement in Ohio. As one of the pioneers in the contest against telephone monopoly Mr. Sapp had many interesting things to say about the early struggles of the men who blazed the way. He told of the first meeting of Independent telephone men which was held in a back room of the Chittenden hotel, April 12, 1895, when there were but three Independent exchanges in Ohio and these were at Mt. Vernon, Norwalk and Chillicothe. The speaker then pointed to the fact that to-day the combined capital stock of the Independent telephone lines of Ohio is over $35,000,000. The three exchanges have grown into a system having 835 exchanges, and there are now 1,663 toll stations, while the number of telephones in service in the state is 270,720. The number of stockholders has risen from a hundred to 24,050. Independent lines and exchanges are now serving every one of the eighty-eight counties in the state except Hamilton county.

President Beam made his annual address, which showed in detail the work of the association in Ohio during the last year. The report proved that material progress was made in 1906 in the state. President Beam pointed out that while the strenuous competition of the past year has improved the telephone service it has also reduced prices. Securities of Independent companies, he said, have advanced to a point where no better investment can be found on the market than theirs. Although so much has been done in the past, he urged continued activity, and the most hearty co-operation among officials and stockholders until the state shall be fully developed. Mr. Beam said that at the present time every county except Hamilton shows a network of Independent wires, and even Hamilton county has a few Independent lines, and will inevitably be fully built in the future as the interests of the business men require such connections.

The following standing committees of the convention were appointed by the president:

Auditing—George H. Metheany, Lima; J. B. Rhodes, Zanesville; George A. Ford, Toledo.

Nomination—R. E. Hamilton, Toledo; A. J. Cullen, Elyria; G. A. Thorpe, Wilmington.

Legislation—W. G. Thompson, Hamilton; Dwight E. Sapp, Mt. Vernon; James S. Brailey, Jr., Toledo; Frank A. Davis, Columbus; C. Y. McVey, Cleveland.

Constitutional Amendments—W. L. Carey, Jr., Cleveland; H. P. Folsom, Circleville; H. C. Devine, Mt. Vernon

Secretary O. O. Welsheimer was unable to present his report as reports to him had been delayed, but promised the delegates to mail them a complete statement within sixty days. Ralph Reamer, the treasurer of the association, offered his financial report showing the organization to be in good condition. The following district reports were made by the vice-presidents of the respective districts: C. L. Norton, No. 1, Cleveland; W. F. Laubach, No. 2, Akron; J. B. Rhodes, No. 3, Zanesville; H. B. Folsom, No. 4, Circleville; W. Gilbert Thompson, No. 5, Hamilton; I. H. Thedieck, No. 6, Sidney; D. M. Odaffer, No. 7, Marion; R. E. Hamblin, No. 8, Toledo; Dwight E. Sapp, No. 9, Mt. Vernon.

At the afternoon session a number of interesting papers were read, including one on "Changed Conditions," by J. H. Ainsworth, superintendent of the Independent exchange at Dayton. Mr. Ainsworth was formerly manager of the Bell exchange at Columbus, and then was opposed to the Independent movement. In beginning his address Mr. Ainsworth referred to his change of heart and said he was only nine months old as an Independent telephone man. His remarks on competition, considering his conversion, were of unusual interest.

"I began my telephonic managerial career in 1888 with the Bell company in a town of 4,000 population," said Mr. Ainsworth, "and my first exchange had just twenty-nine subscribers (not counting extensions as is present Bell practice). The rates were $48 per year for business and $36 per year for residence within one-quarter mile of the central office, and, although we had party lines, they were not operated on the give and take principle as now—the company saving its cable and pole line and switchboard space and granting the subscriber a better rate because of the character of the service—not on your transmitter—they charged you more the farther you were away, and I had one subscriber who paid $9.00 per month, but conditions have changed. Those were the days of the Blake transmitter, which worked so well that when this subscriber of mine, whose office was just across the street, talked to his $9 per month telephone at his coal mine, he might just as well have stuck his head out of the window and conversed with the wide, wide world, and his conversation was almost a disturbance to the neighborhood, it was necessary to talk so loud. But conditions have changed, and he now talks with his people over long-distance transmitters, and transmitters, too, made west of the Hudson river. Those were days when a manager did not dare to order a new set of instruments until he had a contract signed up, binding the prospective subscriber down hand and foot, lest he change his mind, refuse to take the instrument and the poor, struggling licensee company have to pay the royalty anyhow, at least until the instrument could be sent back to Milk street."

The speaker then related his conversion to the idea that competition is good for the telephone user, and added: "What is true of Columbus is true of every other town where the Independent company has come to the rescue of the people, and Cincinnati's business men are beginning to realize that they have been buncoed too long. Cincinnati, thinking herself alive, is telephonically ten years behind her sister cities, and, at a conservative estimate, is losing the

appalling sum of $10,000,000 yearly in trade, and millions more in excessive telephone charges. Unless she gets right on the telephone question, along with Omaha, Denver, Chicago, Milwaukee, Cleveland, Pittsburg, St. Louis, Buffalo, Philadelphia, and even Boston, unless she recognizes the changed conditions, she will be run over in a business way."

Cyrus Huling contributed an instructive address on "Telephone Securities," which showed that he had made an exhaustive study of the question. Stacey B. Rankin of South Charleston read a paper on "Co-operation Between Local and Long Distance Companies," and urged the necessity of first-class construction. James S. Brailey, Jr., of Toledo, discussed the subject "The Independent Telephone in the Public Eye." "Telephone Law in Ohio" was the topic handled by C. B. Matthews of Cincinnati, counsel for the Queen City Telephone Company, who criticized the United States patent office, which, he said, fails in one of its important objects, namely, the reward of inventors, most of whom do not realize on the value of their labor and study. He related the story of the obstacles placed in the path of Independents who tried to gain an entrance into Cincinnati. He urged the state association to exercise vigilance in keeping off the statute books laws inimical to the Independent movement. W. W. Fisher of Bellefontaine spoke on the subject of consolidation of interests of Independent companies. H. P. Folsom of Circleville read a paper on "Sterilization and Preservation of Telephone and Telegraph Poles," which will be found on another page of this issue of TELEPHONY. The formal part of the program closed with an address by James A. Allread of Greenville on "Power and Force of the Independent Telephone Association of Ohio." James B. Hoge, president of the International association, opened a discussion on the question of farmers' mutual companies springing up in various parts of the state and the extent to which they should be countenanced and recognized by the Independent companies. President Hoge desired some sort of an expression of the ideas of the association to carry to the International convention. Mr. Hoge said that in some instances these mutual companies were cutting in on Independent territory and becoming competitors of the Independents in a detrimental way. He suggested that many of these companies bought equipment from the same construction companies patronized by the Independent companies with whom they come in competition. Mr. Hoge thought the trouble could be remedied through the supply dealers, who, he understood, would be more than glad to co-operate with the companies in their endeavor to abate the alleged evil.

President Hoge's position was opposed by Washington Hyde of Darke county and A. W. Richardson of Salem. Mr. Hyde said the farmers' mutual companies have as much right to build, operate and construct telephone plants as anybody in the country. He eloquently appealed to the convention to give fair play to these men who were only now on the ground occupied in the beginning by the Independents. He said they were numerous in his part of the country, and that one company was building a toll line from Warren. "Let us not antagonize them," said Mr. Hyde. "Let us line up with them. We give free exchange service to one of these companies and the other day the company wanted to sell its plant to us. The problem will work itself out in time. Another rural company, and a joint stock company, too, with over 100 telephones, made a contract with us for $4 per telephone for our service. Soon they will prefer to turn over their plant to us, and in fact offered to sell out to us. 'We are farmers,' they said, 'and you are business men. We do not want to run this business.' Let them run the business. It educates them. When we go into new territory we have to educate the people to the use of telephones. Now, why not allow them to educate themselves? Encourage them to do so and it will pay. They will consider us their friends. The Bell people tried to get the same people I have mentioned to do business with them. If we hadn't got them the Bell people would. I would urge this convention to take no such step as contemplated."

On the report of the nominating committee the following officers of the association were elected: President, Frank L. Beam, Columbus; secretary, O. O. Welsheimer, Columbus; treasurer, Ralph Reamer, Columbus. The delegates-at-large to the International convention at Chicago in June chosen were: Frank L. Beam, Columbus; Dwight E. Sapp, Mt. Vernon; James B. Hoge, Cleveland; James S. Brailey, Jr., Toledo; W. Gilbert Thompson, Hamilton; H. P. Folsom, Circleville; I. H. Thiedieck, Sidney; G. P. Thorpe, Wilmington; J. B. Rhodes, Zanesville; C. Y. McVey, Cleveland; Louis Brucker, Mansfield; Cyrus Huling, Columbus; Frank A. Davis, Columbus; Washington Hyde, Warren; D. M. Odaffer, Marion; R. E. Hamblin, Toledo; Charles Hollender, Newark; George M. Adams, Millersburg.

The alternates-at-large selected were: L. H. Beatty, Ravenna; H. L. Clark, Ada; W. W. Morrison, Toledo; C. L. Norton, Cleveland; Leo. Fiehr, Piqua; Dr. C. Jones, Athens; A. J. Curren, Elyria; A. V. Hageman, Lorain; William Hoyle, Cambridge; L. George, Wapakoneta; Clarence Brown, Toledo; C. H. Granel, Painesville; C. R. Newberry, Ashtabula; J. K. Johnston, Sandusky; D. A. Yoder, Bowling Green; D. E. Fuller, Clyde; E. E. Knox, Portsmouth; C. H. Marvin, Urbana.

The district delegates named were: District No. 1, F. A. Knapp, Bellevue; E. L. Coen, Vermillion; District No. 2, W. F. Laubach, Akron; J. F. Smith, Cadiz; District No. 3, A. H. Doudna, Bridgeport; A. B. Hobson, Flushing; District No. 4, H. A. Marting, Ironton; G. A. Schleyer, Circleville; District No. 5, William B. Fee, Milford; Charles E. Biehn, Georgetown; District No. 6, John H. Ainsworth, Dayton; W. W. Fisher, Bellefontaine; District No. 7, George H. Metheany, Lima; J. A. Longwell, Van Wert; District No. 8, E. L. Barber, Wauseon; J. A. Steinkamp, Elmore; District No. 9, G. R. Johnston, Columbus; A. A. Whitney, Mt. Gilead.

President Beam made a happy speech thanking the convention for the honor bestowed and urging the same co-operation and loyal support that had made the association a success in the past.

The committee on constitution made a report, making but one recommendation, which was that the constitution be changed so as to permit of an earlier date for the convention, arranging it so the date would fall more nearly the middle of March. The present date was so near the end of a quarter that it prevented the attendance of bankers and members of loan and real estate men's associations because of quarterly settlements. The convention adopted the report and placed the convention date on the third Thursday in March instead of the last Thursday. The convention then adjourned.

In the evening the delegates attended a banquet, at which Dwight E. Sapp presided as toastmaster. Governor Harris responded to the toast, "Ohio," and Clarence Brown of Toledo to the toast, "Telephone Situation from the Point of View of a Professional and Business Man"; Henry A. Lanman, president of the Columbus Citizens' Telephone Company, spoke on "Changed Conditions in Telephone Securities"; Norman C. McLoud of Cleveland on "The Wireless Telephone"; Hon. C. R. Krickenberger of Greenville on "Hello!"; Dr. S. S. Palmer on "Modern Miracles," and Alfred Robinson, Ironton, on "Pride."

All the conductors of the country lines of the Westchester (Pa.) Street Railway Company have been equipped with telephones of a unique design, which they carry in their pockets. In case of need these telephones can be used at points a short distance apart on the line.

KENTUCKY TELEPHONE CONVENTION

Independents Held Their Second Annual Meeting at Louisville, April 16

By Earl C. Long

THE Kentucky Independent Telephone Association held its second annual convention at Louisville, April 16, and the meeting proved to be successful in every particular. When President M. B. Overly called the convention to order in the "red room" of the Seelbach hotel, there were 138 delegates and representatives of Independent companies present. The convention hall was decorated artistically with flags, maps, shields and mottoes, and from the ceiling in the center of the room was hung a large lantern flying the Independent colors. In the four districts of the state are seventy-five operating companies, thirty-five of which were represented at the convention.

After President Overly had made his opening address the vice-presidents of each district presented a report showing the conditions in their territory, together with the growth during the past year. It developed, much to the surprise of many present, that in the state of Kentucky there are 41,640 Independent telephones as against 42,052 Bell telephones. When these figures were announced and the fact was pointed out that the two interests were on practically an even footing—even though the cities of Covington and Newport are as yet entirely undeveloped by the Independents—there was a round of applause that should have been heard by the co-workers all over the state.

Routine matters filled up the time until noon, but when adjournment was taken for luncheon, everything had been cleared away ready for the exchange of experiences and the instructive remarks that were on the program for the afternoon session. When the convention re-assembled at 2 o'clock, it was addressed by George S. Shanklin, president of the Fayette Home Telephone Company, of Lexington. He discussed Independent telephone securities in a way that riveted the attention of every one present. He spoke of the soundness of Independent telephone companies everywhere and the investigations that had been made of such companies by the two telegraph systems of the United States. He prophesied that the day would come when, for economical reasons, the Independent movement will absorb one system with its thousands of miles of pole lines already in existence, that could be quickly converted into long-distance lines. He also called attention to the bogy of deterioration in telephone plants by comparing in detail the deterioration of telephone equipment and the equipment of traction lines. Mr. Shanklin had studied the matter deeply, and he presented facts and figures to show that the deterioration in traction properties is nearly twice as great as that of the modern telephone plant.

A recital of conditions in Texas was given by J. L. Nunn, an ex-Kentuckian, now located at Amarillo in the Lone Star state. He referred humorously to troubles of a technical nature with which he claimed to be unacquainted personally, but dwelt seriously upon the troubles of a financial nature that he was experiencing in meeting the tremendous demands for increased service, for the reason that the development was growing away beyond anything he had ever before seen in a business way.

Various delegates from different parts of Kentucky followed with tales of experiences, crowned universally with success, and showing that the Independent movement was not only strongly entrenched, but a fighting organization of the highest grade. The fighting side of the telephone movement was graphically given by R. E. Cooper, of Hopkinsville, who, with his associates, had just brought to a successful close a struggle with the Cumberland Telephone & Telegraph Company in the adjoining state of Tennessee, primarily in the city of Nashville. When he closed with the modest statement that Tennessee had at last been freed and that the Independents could now build a telephone plant in any town or city in the state, the convention cheered loudly. The enthusiasm reached a climax when W. B. Stanfield, of Mayfield, Kentucky, told of the battles that had been fought by him and his associates in the western part of the state against the methods of the opposition. When he closed with the statement that in his part of the country they had made the Independent movement a political question and that no candidate for any office had any standing whatever unless he pledged himself as in hearty sympathy with the people's movement for freedom, the applause was without any restraint whatever.

The convention was brought to a close in the late afternoon after an election of officers for the ensuing year had taken place, which resulted in the election of M. B. Overly, of Louisville, as president; W. G. Turpin, of Henderson, as secretary, and J. W. Chambers, of Winchester, as treasurer.

All delegates were guests at a banquet given in the evening by the Louisville Home Telephone Company and the Central Home Telephone Company. Toastmaster Donald McDonald, in his happiest vein, called upon various men here and there throughout the banquet room for impromptu remarks, which kept the assemblage interested until about 11 o'clock.

In addition to the delegates from the various companies belonging to the association, representatives of telephone companies located in Alabama, Tennessee, Illinois and Indiana, which are closely connected by business and long-distance ties with the Kentucky companies, were on hand. Representatives of associations in other states were present in the persons of Jesse W. Wiek, of Indiana, and Albert Parlett, president of the Virginia Independent Telephone Association. About fifteen of the prominent telephone manufacturers sent their officers or general salesmen, who became more thoroughly acquainted with their Kentucky patrons, and enjoyed the hospitality of the Louisville companies.

ILLINOIS MEETING IN MAY.

The third annual convention of the Illinois Independent Telephone Association will be held at the St. Nicholas hotel, Springfield, Ill., Tuesday and Wednesday, May 14 and 15. C. B. Cheadle, of Joliet, the secretary of the association, has extended a cordial invitation to all telephone men in Illinois and neighboring states to attend the meeting, and a large attendance is expected. E. R. Conklin, of Aurora, president of the association, will preside.

WEST VIRGINIA TELEPHONE CONVENTION.

The second annual convention of the West Virginia Independent Telephone Association will be held at Wheeling, W. Va., May 9 and 10, in the National Telephone building. The officers of the state association are: President, W. C. Handlan, Wheeling; vice-presidents, First district, J. H. Wise, Cameron; Second district, W. M. Cayton, Parsons; Third district, J. W. Downs, Buckhannon; Fourth dis-

trict, Hugh Amos, Burnsville; Fifth district. Lon H. Hutchinson, Huntington; secretary, A. C. Davis, Parkersburg; treasurer, Lloyd Beeghley, Weston; member national advisory board, J. Walter Barnes, Fairmont; executive committee, W. C. Handlan, J. Walter Barnes, Lon H. Hutchinson, E. K. Hertford, A. C. Davis

An unusually interesting program has been arranged for the two-day meeting. It follows:

THURSDAY, MAY 9. AFTERNOON SESSION—2:00 O'CLOCK.

Convention called to order by President W. C. Handlan.
Reading of minutes of last convention by Secretary A. C. Davis.
Report of Treasurer Lloyd Beeghley.
Roll call of members and responses in talks of from three to five minutes on the local situation.
President's Address.....W. C. Handlan, Wheeling
"Telephone Associations".....E. K. Hertford, Charleston
(General Manager Charleston Home Telephone Company.)
Appointment of Committees.
General Discussion.
Recess.

EVENING SESSION—8:00 O'CLOCK.

Address of Welcome.....Mayor C. C. Schmidt, Wheeling
Response.....J. Walter Barnes, Fairmont
"The Future of Independent Telephony"
John A. Howard, Wheeling
(President National Telephone Company of West Virginia.)

FRIDAY, MAY 10. MORNING SESSION—9:30 O'CLOCK.

"Standard Construction".....Frank B. Hall, Rochester, Pa.
(Consulting Telephone Engineer.)
"Value of Good Toll Lines".....Frank Hart, Pittsburg, Pa.
(Supt. Long Distance Pittsburg & Allegheny Telephone Co.)
Discussion.
"Pooling of Toll Lines".....W. C. Handlan, Wheeling
(General Manager National Telephone Company.)
Discussion.
"The Folly of the Sub-licensee".....J. Walter Barnes, Fairmont
(General Manager Consolidated Telephone Company.)

MORNING SESSION—CONTINUED.

"Our Employees".....Lon H. Hutchison, Huntington
(General Manager Huntington Mutual Telephone Company.)
Discussion.
Recess.

AFTERNOON SESSION—2:00 O'CLOCK.

Reports of Committees.
"The Right of Territory".....J. W. Downs, Buckhannon
(General Manager Buckhannon Telephone Company.)
Discussion.
"Independent Telephone Securities".....A. C. Davis, Parkersburg
(General Manager West Virginia Western Telephone Company.)
"Rural Telephones".....T. B. Lee
(General Manager State Mutual Telegraph & Telephone Co.)
Discussion.

Other topics for discussion will be depreciation, how charged, successful soliciting, successful operating, standardization of apparatus, toll traffic, how handled, our emblem, sources of revenues, improvements of toll connections, improvement of local service, relations of large and small companies.

The convention will conclude with a banquet, at which toasts will be responded to by the leading telephone men of the state and officers of the association.

MICHIGAN MANAGERS MEET.

The executive committee of the Independent Telephone Managers' Association of Michigan met at Owosso, April 15, and decided to hold the 1907 convention of the association at that city May 8 and 9. The convention will meet at 2 o'clock p. m., Wednesday, May 8. The program the first day will treat of "The Operating Room," while the second day "Toll Work" will be the subject for discussion. Following is the program for the two-day meeting:

WEDNESDAY.

Address of welcome, Mayor Dr. D. H. Lamb.
Response and opening address, F. V. Newman, President.
"The Chief Operator," Miss Margaret Heney, chief operator, Owosso exchange.
"Discipline and Deportment of Operators," Miss Fannie Hiddie, chief operator, Grand Rapids exchange.
"Information Department," Miss Amelia Kowlski, chief operator, Ann Arbor exchange.
"The Merit System with Operators," C. E. Smith, manager, Cadillac exchange.
"Service Reports," H. W. Sexton, wire chief, Owosso exchange.
General discussion, open to all.

THURSDAY.

"Thorough Business," B. L. Carson, manager, Bay City exchange.
"General Handling of Toll Business," Miss Inez E. Close, manager Pontiac exchange.
"Following Up Unfinished Toll Tickets," Mrs. Florence R. Gould, chief operator Battle Creek exchange.
"Co-operation Between Toll Operators," Miss Jessie D. Presley, manager Belding exchange.
"Information on Toll Tickets," Geo. F. Stratemeyer, traffic manager Grand Rapids exchange.
General discussion, open to all.

It is expected that many members of the association will bring their wives, and that all managers will send a large delegation of operators. The general managers of the several companies have been invited to make it possible for chief operators and other lady employes to attend this meeting, the central idea of the association being to have a program that will be interesting and helpful to the branch of the work in which they are employed.

Wednesday evening will be devoted to sociability, beginning with a dinner at 6:30. Following the dinner, Hon. Stanley E. Parkill will give a brief address, after which General Manager Charles E. Tarte of the Citizens' Telephone Company, Grand Rapids, will act as toastmaster for the evening. Following the social visits and toasts there will be an informal dance.

The Independent Telephone Association of Arkansas will hold its annual convention at Fort Smith, Ark., May 20. The convention will meet in the Casino, at Electric Park, and the Pan Long Distance Telephone Company, of Fort Smith, will make the stay of delegates and visitors a pleasant event. A. E. Boqua, general manager of the company, has sent out an attractive souvenir postal card showing the park where the meeting will be held.

The Missouri Independent Telephone Association will hold its annual convention at Kansas City, May 7 and 8. The Coates house has been selected as headquarters. An entertaining and instructive program has been provided.

The annual convention of the Indiana Independent Telephone Association will be held at Indianapolis, May 15 and 16. April 19 the districts in the northern and central parts of the state held their annual meetings to name delegates to the state convention. It is expected the question of exchange of toll service with the Bell licensee, the Central Union Telephone Company, will come up for discussion.

TELEPHONE TALES.

An ingenious superintendent of construction for an Indiana telephone company has hit on the novel plan of using a ferret to assist in installing an underground conduit. The little animal pulled through the pipes the rope to which the cables were attached and enabled the gang of workmen to do in an hour what would have ordinarily consumed many days. A strap was placed around the slender body of the ferret, and tied to this was a small rope to which was attached a larger rope. A large crowd of people watched the experiment. The ferret was pushed into the opening of the conduit, and at the other end, two blocks away, a piece of fresh meat was held. Attracted by the scent the ferret raced through the conduit, dragging after him the rope. Without the aid of the ferret the workmen would have been obliged to use a jointed rod, beginning at one end and screwing on joint after joint until it reached the other end. As soon as the ferret had gone through the conduit he was started through another and after a rest he made a third trip. This method was continued until all five conduits were threaded, after which the cable was pulled through.

DECISIONS AFFECTING TELEPHONY

By Gilbert W. Hand

CONTRIBUTORY NEGLIGENCE TO TOUCH SAGGING WIRE WITH PIECE OF METAL WHILE FORMER EMITS SPARKS.

A VERY instructive case setting forth the law with reference to the foregoing proposition has recently been decided by the court of appeals of Kentucky in which the administrator of the estate of one Edward Wescott recovered a verdict of $15,000 against the Citizens' Telephone Company in the trial court of Campbell county. The facts upon which this verdict was rendered were as follows: "At the time of his death Edward Wescott was in the employ of the Chesapeake & Ohio Railway Company and the Louisville & Nashville Railroad Company as night gate operator, and was engaged at his business in the watch tower at the railroad crossing on Monmouth street, in Newport, Kentucky. In the watch tower there was what is called in the record 'a block signal telephone box,' which is a part of a line of railroad telephone used by the above mentioned railroad companies for their private business, but which is owned and operated by the Citizens' Telephone Company. The telephone line had sagged on John street until it rested upon the highly charged electric wire of the Union Light, Heat & Power Company, and had by this contact become itself dangerously charged with electricity, which it conveyed to the telephone box station in the watch tower. As soon as the dangerous current reached the telephone box it burned out the fuse and manifested itself by a buzzing sound. This unusual condition of affairs attracted the attention of Wescott, who said to John Shaw, the telegraph operator, who was with him in the tower, that 'the thing had a fit'; he thereupon began a series of experiments by placing his finger lightly against the box and withdrawing it so quickly as to make the sparks fly from the highly charged box. He also obtained a short piece of insulated wire, and, holding it by the insulated part, he placed the uninsulated ends to the box, making it emit a shower of sparks. This was begun in the early part of the evening, about dusk, and was continued at various times from then until about twelve o'clock, when he was killed. Early in the evening—two young men, who saw that the telephone line was crossed with an electric light wire at John street, came to the tower and informed the inmates, of whom Wescott was one, of the fact that the wires were crossed, and that the condition resulting was dangerous. Two policemen, who came into the watch tower during the night, before the accident, saw Wescott experimenting or playing with the charged box. Afterwards, as said before, he placed his hand upon the box in such a manner as to receive a shock that caused his hand to grip the box, and at the same time he was hurled to the floor, tearing the box from its fastenings on the wall, and killing him instantly." Upon these facts as brought out by the witnesses for the plaintiff the supreme court said there could be no recovery and accordingly set aside the above judgment, saying: "The courts have gone a long way in saying that the highest possible care should be used by those who manufacture and sell electricity, because the electric current being invisible and silent is difficult to discover and guard against in advance of its fatal effects, but the rule is so well established that it needs no citation of authorities to support it that where one knows of a dangerous condition, although it is brought about by the negligence of another, he cannot idly or wantonly experiment with it at the risk of that other."

Citizens' Telephone Company v. Wescott's Administratrix, 99 S. W. 1153.

GRANT FOR LIMITED TELEPHONE PURPOSES TO WATER COMPANY GAVE RIGHT FOR COMMERCIAL PURPOSES AS WELL.

A New Jersey case arose out of the following facts: In 1891, one Henry Hepburn made a deed to the East Jersey Water Company conveying as follows: "The right of way, over, through and across the lands hereinafter described . . . in and upon which to lay, operate and maintain a water pipe or pipes for the purpose of transporting water to the city of Newark . . . with the right to set up and maintain and operate a telephone or telegraph line or lines thereon and with right of egress and ingress for all purposes." The possession was retained in the grantor. Later this right was assigned by deed to the city of Newark and by it to the Northeastern Telephone and Telegraph Company. When the last grantee became the owner of the easement referred to in the foregoing conveyance it immediately went to work with the business of enlarging the number of wires and erecting new poles, etc., preparatory to engaging in a general commercial telephone business. Arrangements were made by which all the abutting owners excepting Hepburn were settled with in the matter of added burden by reason of the increase of the number of wires and height of poles; the latter refused a settlement and thereupon began cutting down the wires added by the telephone company. The matter reached the courts in an injunction proceeding brought by the telephone company in which it was decided that the above conveyance was general enough in its terms to permit the assignee, the telephone company, to make the additions it had planned and that notwithstanding the fact that the settlement had been made with other abutting owners, nevertheless, since there was no lawful right of objection by Hepburn to the action of the company, he had no claim to compensation or consideration. "The conduct on the part of the company (in settling) ought not and will not prejudice its right to the relief it asks in this court if such right is clear under its contract." Objection was made to the fact that there was an increase in the burden caused by the stringing of additional wires and the replacing of the old poles with larger ones and longer cross arms. The court said on this point that "by a telephone line or lines is meant a line of poles carrying an unlimited number of wires, and that such a line is not rendered plural in nature by having more than one wire stretched on it. It still remains a single line." The water company had only had two wires strung on the poles but the court held in answer to the allegation that the use of the words "line or lines" in the grant of authority was to be confined to a use within the scope of the wants of the previous grantee, the water company, that the telephone company being a purchaser of the grant in good faith, not having notice of any oral agreement or arrangement, was not bound in any way thereby and could proceed in any manner with the business of erecting a general commercial telephone system over the right of way which had been originally conveyed for the limited use above referred to. While the oral arrangement was to limit the use to the purposes of the water company for laying water mains and for stringing such telephone wires as it might need in its business, nevertheless the purchaser of the grant in good faith, not knowing of any such restrictions, was not limited thereby. "They (defendants) contend that the East Jersey Water Company had no power to take and accept a grant of a right of way to maintain a telephone or telegraph system. The answer to this objection is simply that it does not lie in the mouth of the grantor

of real estate or an interest in real estate, to set up that the grantee was incapable of receiving and accepting the title or right so conveyed. Only the public authorites can take advantage of this disability." The injunction prayed for was granted.

Northeastern Telephone & Telegraph Company v. Hepburn, 65 Atlantic 747.

DAMAGE FROM LIGHTNING BROUGHT INTO HOUSE OVER TELEPHONE WIRES REMAINING AFTER INSTRUMENT HAD BEEN REMOVED.

Another recent Kentucky case calls to mind the necessity of care in seeing to it that telephone wires left after the service has been discontinued are so protected that no damage can result from the above source. One Lewis Evans is the owner of a house and lot in the town of Proctor, Lee county, Kentucky, and in 1902 had telephone connection over the system of the Eastern Kentucky Telephone and Telegraph Company, which service was discontinued in 1903. The wires were left in the house after the instrument had been taken out. This condition continued another year and in the summer of 1904 during a severe electric storm lightning struck a tree upon which these wires were fastened and as a consequence was carried into the house, causing considerable damage. At the trial the court instructed the jury that there was no negligence and that there could be no recovery. An appeal was taken and the following statement of the law applicable was made by the Kentucky court of appeals: "It is insisted that the loss was due to the act of God, and that the plaintiff was as much responsible for the trouble as the defendant. While lightning is the act of God, the carrying of the lightning into the plaintiff's house was the act of the defendant, and it was a question for the jury whether the defendant had used such care as might be reasonably expected of a person of ordinary prudence under the circumstance. The plaintiff had ordered the defendant to take out both the box and the wires, and it was a question for the jury whether he, by his want of care, contributed to the loss, or acquiesced in the wires remaining in the house when he knew, or by ordinary care should have known, the danger. He had once notified the company to take out both the box and the wires, and though he knew that they had not complied with his request, he may not have known that they had so left the wires as to be a source of danger. In 27 American and English Encyclopedia of Law 1017, the rule is thus stated: 'In placing wires for conducting electricity into a house, a telephone company owes the persons living there the exercise of reasonable care, proportioned to the known dangers of the conditions, to prevent the wires acting as the conductors of lightning into the building, and it is liable for damage resulting from neglect to provide against this danger. Especially is it liable where damage from lightning occurs through its failure to remove its wires when the person living in the house has ceased to subscribe for a telephone.'" The case was therefore reversed and sent back for trial before a jury.

Evans v. Eastern Kentucky Telephone and Telegraph Company, 99 S. W. 936.

FIREMAN TAKES HIS OWN CHANCES WHILE ENGAGED AT FIRE FROM DANGERS OF CHARGED WIRES WITHIN THE BUILDING.

In a Nebraska case it was shown that a fireman was engaged in putting out a fire in a certain building and that in the progress of the work it became necessary for him to place a ladder between certain wires of an electric light company. While so engaged he received assurances from one Brinkman who was present to look after the property of the electric light company that the wires were "dead." In removing the ladder from between the wires he received a shock which caused his death. Suit was brought for damages. Brinkman was present merely for the purpose of seeing to it that no more of the property of his company was destroyed than was necessary. The question arose whether this statement of Brinkman that the wires were "dead" placed actionable negligence on the company. The court held that no duty rested on the company under the circumstances to warn the fireman of the danger and that in removing the ladder, even after the statement that there was no current in the wires, the fireman was still bound to take his own chances on the consequences. While the case was against an electric light company it serves to emphasize the proposition that under such circumstances firemen must rely on their personal knowledge of dangers from currents from wires at such times. The statement of Brinkman was a mere opinion and not coming from a person in authority in the company, the latter was in no way at fault.

TELEPHONE CONVERSATIONS IN EVIDENCE ADMISSIBLE IN ILLINOIS THOUGH WITNESS DOES NOT KNOW OTHER'S VOICE.

In a suit to recover for certain drafts paid by the Ham National Bank in favor of the Godair Commission Company, the testimony of one Peavey, the cashier of the bank, was to the effect that an agent and stock buyer for the commission company had been in the habit of calling on the bank for the payment of drafts drawn by him on the credit of the commission company; that on the occasion in question he called up the commission company and asked for Mr. Godair, who lived in East St. Louis, and was informed that Godair was not at his office; that later the commission company called up the bank and said that the party wanted was in, whereupon Peavey inquired if the drafts would be paid and was notified that same would be done. Peavey testified that he did not know the voice of Godair and on this ground objection was made to the admissibility of the conversation. The supreme court of the state said as follows in deciding this proposition: "In the case of Wolfe v. Missouri Pacific Railway Company (Missouri), 11 S. W. 49, substantially the same question presented here was passed upon by the supreme court. It was there sought to introduce a conversation had by telephone between a witness and some person in the business place of one of the parties to the suit. The evidence was held admissible. The court said: 'When a person places himself in connection with a telephone system through an instrument in his office, he thereby invites communication, in relation to his business, through that channel. Conversations so held are as admissible in evidence as personal interviews by a customer with an unknown clerk in charge of an ordinary shop would be in relation to the business there carried on. *The fact that the voice at the telephone was not identified does not render the conversation inadmissible.*' While the weight to be given to such conversation is to be determined by the jury, we think the reasoning of the Wolfe case satisfactory, and in our opinion the court did not err in admitting the evidence." It will be noted that the rule on this point is different in some other states, notably Washington and Pennsylvania.

Godair et al. v. Ham National Bank, 80 N. E. 407.

One of the strongest Independent telephone companies in Canada, La Compagnie de Telephone de Bellechasse, has changed its name to "La Compagnie de Telephone Nationale." Dr. J. F. Demers, of Levis, Quebec, secretary and treasurer of the company, writes TELEPHONY that the concern has obtained an amended charter from the provincial parliament, which grants enlarged powers and authorizes an increase in the capital stock. The new charter gives the capitalization as $1,000,000, and limits the future issue of capital stock to $5,000,000.

CONVENTION PAPERS

Some Interesting Addresses Made at Recent Independent Meetings.

DEPRECIATION.

THE question of depreciation is one that requires our most careful consideration. It is one of the most important factors in calculating the earnings and success or failure of our investments. There is a wide difference of opinion as to the proper percentage to be placed to the credit of this account and the proper method of handling the account. Depreciation is the loss upon your assets, which are diminishing in value from year to year.

When our plants were first constructed for about 500 to 800 subscribers (which was usually a fifty per cent increase over the Bell list), the cost per subscriber's line complete was about $55 or $60, including the switchboard. By adding to this plant in the way of overhead cables and wires, additional switchboard and operators, it was possible to use this equipment and construction with fair results until the 1,000 mark was reached, when it was found necessary to entirely rebuild the system, in most instances placing cables underground in the business section, replacing the outside pole construction with heavier and longer leads, put up new cables and take down the old. The exchange, having outgrown its usefulness. must be discarded and an up to date, common battery, lamp signal, multiple switchboard installed, with all the necessary expensive apparatus entering into its construction and operation. The old equipment, while not being worn out, if sold at all, would only bring about ten per cent of its original cost. One reason for this heavy depreciation is owing to the rapid improvement in telephone apparatus, which makes second hand equipment practically worthless. About the only material that can be used again is the poles themselves, and most of them must be changed or taken down and reset in another place, making them cost about two-thirds as much as new; and if the shortened life had been taken into consideration, the cost could be figured at about the same as new. The overhead iron wire which has been in the air subject to the city smoke for five or six years has been practically destroyed by corrosion and rust. Aerial cables that have been up for six or seven years are found in most instances to have depreciated to such an extent from crystallization, improper handling and wear and tear as to preclude the possibility of their being used again. The crystallization of the lead sheath is caused by the vibration of the pole line, due to wind and other causes, such as street car overhead construction, when same is directly or indirectly attached to the pole line. In this connection it might be well to call attention to the very rapid deterioration of aerial cables crossing and attached to bridges. The vibration is so great as to cause an absolute destruction of an entire cable in as short a period as two or three years.

In order to properly house this new and expensive central office equipment and insure it against fire, it is necessary to abandon the old quarters and construct in most instances a fire proof building as a central office. This entire rebuilding of the plant for an exchange of 2,500 to 3,000 will cost on an average of about $120 per line, so that it is safe to say that almost the entire original investment has been lost through depreciation. Depreciation enters largely into your maintenance expense, and should be very carefully taken in your calculation when you are figuring on your dividends and net earnings. The methods of ascertaining the proper amount to be placed to the credit of this account are many and productive of very different results, as to the correct charge. Owing to different conditions, the difference in construction, and handling of the several properties, it is impossible to lay down invariable rules. I believe all practical telephone engineers maintain that from ten to twelve per cent should be allowed.

It is safe to say that on plants of first-class construction the telephone leads them all in the matter of depreciation. It is calculated that on electric railways the figures are from five to eight per cent, on electric light plants five to ten per cent, but on telephone construction eight to twelve per cent.

When the plant is new the percentage is probably considerably less than ten per cent, but as the construction grows old, it increases from year to year until it is considerably more, and probably reaches as high as fifteen per cent, so that if the actual depreciation charges were ascertained, and made from year to year, the rate would so increase as to become a burden upon the property in the latter years of its operation almost too heavy to bear. Reconstruction due to rapid increase, enters very largely into this calculation, as the depreciation upon material taken down will average from fifty to one hundred per cent, if it has been in service any length of time.

Whatever rule or method is determined upon should be very closely adhered to for several years in order to demonstrate its accuracy. If we determine that the life of our plant is ten years and therefore the depreciation ten per cent, we should use practically the following table (for which we are indebted to Keister's "Corporation Accounting"):

On original cost—

	YEARS:										
	1	2	3	4	5	6	7	8	9	10	
Depreciation percentage....	10	10	10	10	10	10	10	10	10	10	=100
Repairs.....	1	2	3	4	5	6	7	8	9	10	= 55
Total ann'l charge	11	12	13	14	15	16	17	18	19	20	=155

That which leaves a residue of value under any circumstances should be depreciated upon its diminishing value, and as our plants will leave a very material value at the end of ten years, we should consider carefully the following table:

On diminishing value—

	YEARS:										
	1	2	3	4	5	6	7	8	9	10	
Depreciation percentage....	10	9	8.10	7.29	6.56	5.90	5.30	4.78	4.30	3.87	=65.11
Repairs	1	2	3	4	5	6	7	8	9	10	=55
Total ann'l charge	11	11	11.10	11.29	11.56	11.90	12.30	12.78	13.30	13.87	=120.11

For illustration: If our plant costs say $1,000 with a determined life of ten years, depreciation ten per cent, we make the following deduction:

"That which expires in 'life,' leaving no residual value should be divided by the given number of years for that life upon its original cost."

This $120 with the residual value of $34.89 makes up the total charge of $155. You will see that depreciation on the original cost is therefore a writing off of the actual capital without having the residual value.

We believe that the general practice with most companies is to charge off to depreciation a sufficient amount of the surplus earnings to cover whatever per cent they may decide as the proper amount to charge to this account. This earning has, however, in nearly all instances been used in extensions and renewals and does not represent actual cash. It is very convenient to be able to use this fund and then dispose of the excess earnings in this manner, without declaring additional stock in dividends, but the question arises, is it the proper procedure. I maintain that it is not; there is only one safe way in which we can possibly provide for our future, and that is to establish a reserve fund and annually or semi-annually set aside to the credit of this fund a certain amount of the gross rental from each instrument in service, or carry to this fund a certain percentage of your total investment not less than three or four per cent in actual cash, the same to be held as a reserve, to be drawn upon in extraordinary emergency or to reconstruct your plant in ten years. This reserve will stand as a protection against your investment. Your securities would take a standing among the best because they would be guaranteed by a cash backing that would insure their value.

If there are those that object to the cash reserve fund, I would suggest that a certain percentage of the amount of earnings expended on new work every year, be charged to betterments which would reduce the apparent earnings and at the same time keep down the maintenance and repairs expense, enable you to make a good showing and fortify yourself in a manner against the future. If something of this kind is not done, the inroads made by depreciation will put your balance on the wrong side of the ledger.—*Paper read by H. A. Douglas before the Iowa Independent Telephone Convention.*

OUR RURAL FRIENDS.

We all have our rural friends or subscribers, and I think we can all honestly say that our farmer subscribers give us less trouble, in the way of kicks and complaints about the service, than any of our town or city subscribers. So we can truly say they are our rural friends.

But the trouble occurs with our mutual farmer companies and in some cases we are unable to call them our friends, and the question we are constantly asking each other is, how shall we deal with the mutual farmer companies? And I wish to say to you that this is a very hard question to answer, for each locality has its own conditions to meet and what would answer for one company could not be made to meet the requirements of another, but what we all want is that the mutual farmer companies do not lose sight of the fact that it was through the efforts of the Independent telephone

companies of the state of Michigan that made it possible for the people of the rural districts to be able to talk to their neighbor, town or city, and until the farmer companies have this fact firmly fixed in their minds it will be up-hill work dealing with them.

The trouble with farmer companies is that they get what is commonly termed "the big head." When I say this I do not mean each individual member of the company, but only as an organization, for in each farmer company you will find men of good sound judgment who know what is just and fair as between man and man. They think because they have one hundred to two hundred members or even a less number that the eyes of the whole state are fixed upon their little company and they think they can dictate any terms and that there shall be no deviation from those terms whatever. They simply lose sight of every legal or moral obligation they owe to the Independent telephone companies.

Our farmer friends as a class are a peculiar people with which to deal, their independence and remote positions making it all the harder, and our success depends on our ability to get and keep close to them and make them feel that we are their friends indeed and not from purely selfish motives.

It is useless to enumerate the difficulties that have come up to disturb our business relations, as we are all more or less familiar with them; but the question is, how shall we overcome these difficulties to our mutual advantage? The country telephone problem is very much different from the town or city; as much so as any two different lines of business. We must, therefore, make a close study of both conditions, but more especially the rural, and try and work out some plan whereby we shall be able to keep our farmer friends with us and not let them be led astray by our enemy, for as we all know it is the rural business that the Bell people at this time are making a special effort to secure and they are doing this with misrepresentations and false statements which our farmer friends find out when too late.

So let us all make a closer study of rural telephony and see if it is not possible to find some way and formulate some plans whereby we may induce the farmer companies to join with us, for it is an old and true saying that it is better to have them with us than against us.

What the Independent telephone companies do not want to lose sight of is that the agricultural interests of a country are preeminent; prosperity on the farm is prosperity in the town or city. The season of good crops is the season in which all trades and industries are active and profitable.

Before the manufacturers can work up to full capacity, they must have supplies of the raw material which come from the farming sections. The wool, the cotton, the lumber and the wheat come from the farm lands to the feeding and housing of the overcrowded cities and towns. All these products brought to the market, our farmer friends receive the ready equivalent in the money which will buy for them the conveniences, luxuries and necessities, made possible by the skill and genius of this advanced age.

Is it any wonder that the first thought of our farmer friends is the possession of that combination of convenience, luxury and necessity, the telephone and telephone service? And if they wish telephone service, let us see to it that they have it, if there is not as much profit in this kind of service as some others. Build, own and control the lines built out to our farmer friends and we shall find less complaint about service, less petty annoyances and no danger of lines being connected with those of our competitor, the Bell. And to our farmer friends who own their telephone lines, remember to whom you owe the credit for making it possible for you to enjoy the privilege of telephone service which you now have and co-operate with them and not with the people who tried to keep service from you.

My farmer friends, do you know what co-operation is? Co-operation is like charity and begins at home. Co-operation between two companies is facilitated by success, pleasantry, mutual understanding, close acquaintance and overlooking each other's faults, eliminating all shams, underhanded dealings, sharp practices, autocratic manners and other elements of human nature and you will be "it" with a capital I. Do not be afraid that the Independent telephone companies are trying to get the best of you, for that is not so. We want you with us. Do unto others as you would be done by and you will have no cause to regret it.

Several years ago the Bell telephone company controlled the whole territory in the United States, but developed only the larger cities and towns. The demands of our farmer friends for telephone service were given no attention. Not until the Independent movement had become so popular did the Bell company try to develop the rural territory; not until thousands of telephones were installed by the Independents did the Bell company sit up and take notice. But now this wolf in sheep's clothing, finding he cannot harm the larger Independent companies in the cities and towns, has turned his attention to the rural districts, spreading discord and strife, and is offering our farmer friends sub-licensee contracts and renting them instruments at seven dollars per year and other schemes to make a break in our territory. If our farmer friends will stand by us shoulder to shoulder, back to back, and co-operate and help, each with the other, we shall surely win the victory, remembering that no one ever really succeeded who climbed over his friend's shoulders to get there. But carry your friend up with you, and should our friend be somewhat unreasonable in his demands do not turn him down cold without careful investigation, for what is done in haste is sometimes repented at leisure. Ever bear in mind the old maxim, "A thing well begun is better than a thing overdone."—*A Paper read by A. B. Fishback before the Michigan Independent Telephone Convention.*

DEVELOPMENT OF LONG DISTANCE BUSINESS.

In presenting this paper to you, I do not make the claim of originality, but that the condensation of methods, if carried out, would aid in increasing the revenue from the long distance lines. I will not dwell on the conditions of the toll equipment, lines, number of circuits, etc., as it is an old adage that "a wise mechanic does the best job possible with the tools in his possession"; therefore, I take it for granted that a wise traffic manager will try to build up his business to the points he can reach the most satisfactorily, not trying to induce subscribers to use lines to points to which they will be unable to talk, as it is very difficult to get business back after being lost through poor service.

The method we have used in introducing new connections is as follows: I find that it is less difficult to advertise new lines from the smaller city or town, as there are fewer people to reach, so when you have a line in first class condition, it is well to give free service for a few days from the smaller city or town. The people there will take advantage of it and call up those in the larger city who are in the habit of calling them, thereby advertising the fact that there is a new line to talk over. You will have some one calling up to ask the state of the weather and other unimportant things, but if the connection is satisfactory it will do no harm, as they may say a good word that will be beneficial at some future time. The next thing to do, after the free service is over, is to have one of your pleasant voiced operators call up each subscriber who may have cause to use the line. She should use good judgment in getting some one in authority to talk to, and should be well posted as to what to say, which should be something along this line: "Is this Mr. Jones? This is the long distance department of the Home Telephone Company. I wish to inform you that our new lines to Allentown have been completed and we can give you first class connections with Allentown, Scranton, Wilkesbarre, Wayne and all other points in eastern Pennsylvania. Would be pleased to have you try our lines the next time you talk to any one in that locality." This will usually start them asking questions about other points, so the operator will have to be well posted as to all points reached. She should keep a record of all questions of importance asked her, turning this into the manager. This will give very good material for the solicitor to work on later. This method of calling up the subscriber I consider a very beneficial, effective and economical way of advertising.

Now comes the circular letter. This should be typewritten and addressed properly to each person or firm and should say what lines have been completed to various points, stating briefly anything of special interest, and should be as short as possible to insure reading. You should always have something catchy in the way of advertising slips to inclose in each letter mailed by the company, no matter to whom it goes. The usual newspaper, bill boards and street car advertising may be used at the manager's discretion, as this runs into money fast and will have to be governed by the conditions and the results expected. The work of the solicitor now follows. In introducing new lines it is well to use the message pass, this to be given out by the solicitor or manager. I think this system of giving free service works more satisfactorily in larger cities than the universal free service mentioned before for smaller cities, as you are enabled to place them where they do the most good, and also to ascertain to whom they converse. The passes should be in book form, about twenty-five in each book, with stub attached. On the stub should be the number of pass and to whom issued. To go with this you should have a test call ticket printed for the toll operator. This slip or ticket when filled out gives the solicitor something to work on when he makes his return visit. There are many other styles of advertising that are beneficial, but I have not the time nor space to elaborate on each separately. As you are familiar with the coupon system, I will not discuss that in detail, but will give our way of handling it. The first work for the solicitor to do is to induce the subscriber to use the lines, however little it may be, keep close record as to the extent used, and as soon as the amount justifies, call and sell him a small coupon book, increasing the size as his business increases. I have made out monthly a statement covering the amount of toll used by subscribers using in excess of one dollar per month. This statement covers six months, always dropping one month as the new month is added. In this way I can tell whether each subscriber's business increases or decreases. This is valuable information as to the size of the coupon books they should have.

Careful records should be kept of the amount of traffic over each line outgoing, incoming, through and the maximum day. These records are of great importance, as they show whether you are getting the proper amount of business over your circuits and when you require new circuits, so as to invest the money you have to

spend in improvements where it will do the most good. There is one peculiarity about the telephone busines—it will not stand still. It is bound to go ahead or back, so with the best of methods and the best of tools on earth for conducting business, there is still one element necessary to insure against your being classed with the "also rans" and that is covered by the one word "hustle."—*Paper read by Frank Hart before the Pennsylvania Independent Telephone Convention.*

STANDARDIZATION OF TOLL LINE EQUIPMENT.

The question of standardization has occupied a prominent place in the minds of telephone engineers and operators since the advent of the Independent movement. There are few problems in connection with the telephone business so full of possibilities both for good and for evil as those which confront us under this head.

When we speak of the standardization of toll line equipment, there immediately arises in our minds the idea of telephones and switchboards all built of uniform design, with similar parts of various makes interchangeable; and without hesitation we plunge into the argument as to the advisability of such an arrangement. A second thought, however, gives us a broader vision. When we speak of "toll line equipment" we have to do with things other than switchboards, circuits and telephones. We have to deal with all the physical accessories necessary for the carrying on of toll line business.

A short time ago a very significant interview took place between the general manager of the Chicago Telephone Company and a number of Chicago aldermen. The manager was defending the Chicago Telephone Company's right to a monopoly of the telephone business in the city of Chicago. His principal argument was that the Chicago Telephone Company was the only company qualified to give efficient long distance service. Why? Because they were affiliated with the American Telephone and Telegraph Company. And why could not other companies compete with this company for long distance business? Because the American Telephone and Telegraph Company was able, because of its monopolistic power, to control its terminals and by means of "standardizing" its equipment to "harmonize" its service. His answer was pregnant with meaning. Every clause could be made the subject of a text book. Standardization was the means, "harmonization" was the end and monopoly the agent.

King George scoffed at the thought of harmony among the colonies just as the "dictator" in Boston scoffs at the possibility of harmony among Independent telephone companies; but history has demonstrated the fact that the path of progress lies in the direction of harmony without a dictator.

Toll line equipment naturally falls under six distinct divisions:

1. Central office equipment.
2. Station equipment.
3. Line equipment.
4. Accounting equipment.
5. Advertising equipment.
6. Miscellaneous equipment necessary for the efficient organization of various companies for the purpose of handling inter-company affairs.

It would be utterly impossible under the limitations of the present occasion to enter into the details of each of these topics. Therefore, I must be satisfied to endeavor rather to impress upon the minds of my hearers the importance of further discussion and careful consideration of the problems set forth.

Early in the history of railroad engineering it was found necessary to standardize along a few fundamental lines. For instance, the tracks must all be of the same gauge, the trucks of the same height, the couplers so constructed that all kinds of cars could be coupled together. In the same general way must we standardize switchboard and station apparatus. Absolute standardization of this apparatus would do for telephony what Buddhism did for China. However, such fixed principles should be laid down as a basis for construction of toll line, switchboard and station apparatus, governing circuits and mechanical accessories, including the quality of the material entering into the construction of such equipment, as would preclude the possibility of cheap apparatus being palmed off upon the unskilled purchaser, and thus destroying the efficiency of a service which otherwise might be excellent. It is true that the leaks due to low resistance coils bridged across the line at the terminal points cause a far greater loss of talking efficiency than the actual resistance or capacity of the line. I have found that at least seventy-five per cent of the chronic cases of toll line trouble at the stations belonging to and connecting with several of the largest toll line companies in the state have been caused by circuit trouble that could be easily avoided by following a standard set of circuit specifications.

The standardization of line equipment is easier of accomplishment from the standpoint of the engineer. It is absolutely essential at the present stage of development. During the Russian-Japanese war the Trans-Siberian railway service failed because of one weak point, causing untold disasters at the front. Just so a toll line is no stronger than its weakest point.

Standard construction is necessary before there can be any just apportionment of profits between connecting companies. At this time, when the Independent companies throughout the state are combining to build toll lines and heavy trunk lines for carrying long distance business, it is especially necessary that they immediately confer and agree upon a set of standard specifications, and thus avoid the injustice and the almost endless trouble and controversy sure to result unless standard construction is employed by the different companies which are parties to long distance traffic arrangements. Such an arrangement is not new or unheard of. The Long Distance Telephone Association has adopted a set of standard specifications for long distance lines which it has published in book form. Such a publication indorsed by the state association and agreed upon by all of the long distance companies doing business throughout the clearing house would, when put into practice on all new lines, work wonders in the way of increased efficiency of long distance service, and greatly increase the capacity and earning power of long distance lines.

When we think of station equipment, in the light of our past experience, it almost makes us weep. By station equipment I mean not only the telephone bridged on the toll line, but all of those devices used by long distance companies to get connections through the smaller exchanges of Independent and mutual concerns. All kinds of arrangements are in vogue. A collection of the apparatus now in use by a large number of companies would be a valuable addition to the national museum, provided each were tagged so as to indicate to the telephone man of the future the use to which it had been put.

It is this apparatus more than any other that has crippled Independent long distance business. To any one not familiar with the results being obtained by the various companies over the state, the amount of "failed business" due to imperfect station circuits and local conditions is almost unbelievable.

The superintendent of a company controlling a number of long distance lines and exchanges recently had occasion to inquire of one of his station agents why a certain extensive user of long distance lines did not give the Independent company more of his long distance business. The agent replied that he could not give first class service to the stations most used by his patrons and consequently the business went to a competing company. Thereupon the superintendent immediately required the local agent to furnish him a list of the parties called by the patron and immediately notified the agents at those stations to place the lines of the particular parties wanted in first class condition, soldering all connections, and giving the lines and instruments a thorough overhauling. He also instituted a careful inspection of the office equipment and all defective circuits and equipment were rearranged or replaced. The results were all out of proportion to the effort.

Stations whose agents or managers had been for months complaining of poor lines suddenly found that the old and supposedly worthless circuits were giving a fair grade of service. The business at the station referred to was nearly double. Letters to connecting companies in some cases met with prompt and cordial response; in others a curt denial of any existing trouble at that station. Where co-operation and to a certain extent standardization was secured excellent and in some cases surprising results were obtained, bringing about great benefit to all concerned. Where co-operation was refused, the same old story continued, and the local companies are still "roasting" the long distance company and its lines, which are giving excellent service to all but the "kicker."

Here is a lack of harmony, due in the first place to a lack of standardization and, secondly, a lack of standardization, due to a lack of harmony. And here, too, is a loss of thousands of dollars annually to the companies represented at this convention.

Standard accounting has already received considerable attention, and the result is the clearing house. There remains but one other subject—standard advertising. There are but two "systems"—the Independent and the Bell. Systematic advertising pays. If you doubt it just follow the policy and the results obtained by our competitors.

Iowa has the name of being the foremost state in the Union in its wonderful telephone development, yet we see our sister states, Missouri, Illinois, Indiana and Ohio, taking the lead in an effort to standardize and harmonize. Thus far we have only scratched the surface, but we have discovered traces of hitherto unthought of sources of wealth. Present properties may be increased in usefulness and consequent value, and undeveloped resources may be uncovered by a concerted effort in this direction. It is my firm belief that all companies interested in Independent long distance business would receive large returns on their investment by refering these questions to competent and energetic men, with instructions to work out the details and prepare for action.—*Paper read by W. J. Stanton before the Iowa Independent Telephone Convention.*

THE STERILIZATION AND PRESERVATION OF TELEPHONE AND TELEGRAPH POLES.

In maintaining telephone, telegraph, electric light and interurban railway companies, one of the greatest problems that confronts the management is the inevitable depreciation of the outside construction work of the plants. One of the largest items of this depreciation account is that caused by the rotting of poles.

The importance of this subject will be appreciated when we say

that there are 250,000 miles of telegraph pole lines and about 500,000 miles of telephone poles in the United States, making a total of 750,000 miles. It is safe to say that these lines average thirty-seven poles per mile, making 27,750,000. The poles used for electric railroads and electric light plants will make an addition of 5,000,000, or a grand total of 32,750,000 poles. This is in accordance with the government report of 1902. It is estimated that there were over 40,000,000 poles in use by the above companies in the United States at that time. The value of these poles, placed in the ground ready for use, will average from $5 to $7 each, or about $200,000,000. This vast amount of property is exposed to the weather and is constantly decaying; this decay goes on day and night and is as certain to cut the pole down as death is certain to overtake man and cut him down.

It seems strange that, with all the boasted scientific knowledge and great inventive genius of the American people, they allow over $200,000,000 worth of property to remain exposed to the ravages of these destroying bacteria and fungi with scarcely an effort made to find a remedy. It is evident that if some means can be found to destroy this germ at the soil line, and at the same time protect the pole from the attack of those which remain in the surrounding soil, at a reasonable cost, the great problem of the depreciation of telegraph and telephone poles is solved. If the life of the pole from the surface of the ground up and down a few inches can be prolonged ten or twelve years, it will add millions of dollars to the values of our telephone plants, and the stocks and bonds of all companies that use poles will be vastly increased in value.

The average life of a white cedar pole is said to be from twelve to fifteen years; it varies, however, owing to its condition when placed in the ground and the nature of the soil and climate. All poles and posts rot off at or near the soil line. The decayed portion extends a few inches above and about three or four inches below the soil line, the depth below being governed largely by the nature of the soil. The portion of the pole from the soil line to the top will last many years. Indeed, there is reason to believe that it will last three times as long as the portion that goes into the ground. Again, millions of poles are being used each year to replace the ones that rotted off. The Bell company used over 500,000 poles in one year to replace old ones. Vast areas of forest are being denuded of poles each year, and they are constantly growing scarcer as well as more expensive. Where the telephone and telegraph companies are going to procure their poles in the next ten or twenty years is indeed a problem worthy of the most careful consideration.

It is a singular fact that it is only of recent years that the true cause of the decay has been discovered, although there have been experiments made for the past forty years to preserve poles. It would be interesting, if time permitted, to follow the many experiments in Europe and America in this line of investigation. Indeed, our own many failures and successes in the past six or seven years would not be uninteresting. In many ways we have been fortunate. We have had the benefit of the experiments of the most learned scientists that have preceded us in this line of investigation; their mistakes as well as their successes have aided us. There is no lack of literature on the subject of preserving timber, covering the past seventy-five years. Since the germ theory of disease was recognized as true, the subject has engaged the attention of some of the most accomplished bacteriologists and microscopists in this country and in Europe. The United States department of forestry in the past two years has been experimenting with the co-operation of the Western Union Telegraph Company in the preservation of telegraph poles. The result of their work has not been made public on account of the time engaged being so short. The great trouble with most of the work done is the experimenters have been endeavoring to sterilize the pole before placing it in the ground. Our endeavor has been to sterilize and protect the poles already in the ground.

It has been proved beyond question that the decay which takes place at or near the soil line of the post or pole is caused primarily by living organisms—namely: bacteria or fungi, and in some rare instances by insects. Bacteria and fungi are low forms of life; they multiply when once they attack the pole with great rapidity, and since their action on the fiber of the wood is practically the same, they will be considered in this paper together. They attack the walls of the cells and the result is the familiar decay or rot under consideration.

There are two conditions necessary for the existence and rapid growth of those living germs of destruction: First, there must be a certain amount of dampness or water; secondly, there must be a certain amount of heat and, some scientists claim, a certain amount of oxygen. This, they claim, is shown by the fact that bacteria and fungi do not ordinarily affect the pole more than a few inches below the soil line, unless the soil surrounding is very loose or porous. It has been observed that a line of poles running through a pasture field where there is grass growing will be more quickly attacked than in any other situation. Again, a line of poles situated on the north side of a hill will be more quickly attacked than if on the south side, provided the soil is loose and porous. A pole under water will not be attacked by fungi and bacteria, neither will it when surrounded by soil containing certain chemicals. A few years ago it was thought by telegraph and telephone companies that, if the dirt was heaped up around the pole, thus leaving a certain amount of drainage away from it, no decay would take place at the soil line. Experience has shown that this was a mistake, as the pole was attacked just the same, only a little higher.

It will be observed in passing that the great enemy of the telephone pole is the same that attacks millions of railroad ties. The conditions surrounding a railroad tie are more favorable for the rapid growth of the bacteria and fungi than in the case of a pole They lie flat on the ground, constantly absorb moisture, and, being exposed to the rays of the sun, have the two necessary conditions for rapid growth. The problem of protecting and sterilizing railroad ties is a much more difficult one than we have to contend with in the case of telephone poles, although it is generally supposed by experimenters that this is not the case.

Realizing the great importance of this subject, we began our experiments in the use of antiseptics six or seven years ago, although some of our experiments in the preservation of posts and poles have extended over a period of nearly twenty years. We directed our attention to poles that were in the ground and already infected. We believed if it were possible to save the life of a pole which had already been attacked and was partially rotted off, it would be a comparatively easy task to sterilize and protect a pole which had lately been placed in the ground. We believe we have found a means to sterilize poles in the ground that is practicable and certain, and that, too, at a cost which is reasonable and much less than the natural depreciation will amount to.

We cannot better explain our process and give you the results of our experience than by relating some particular instances of our experiments. We were very desirous of making a thorough test, one that would conclusively demonstrate the efficiency of the process. It having been demonstrated by a long line of experiments that the cause of decay at the ground line was a bacteria or fungus growth induced by a certain amount of moisture and heat from the sun, it was obvious that in order to sterilize and save the life of the pole, we must use an antiseptic that would penetrate the pores of the wood. We selected a class of poles that had been in the ground for about eight years and which were thoroughly infected with germs; indeed, some of the poles upon which we experimented were over half rotted through, and could not have lasted two years under the most favorable conditions. They were so weak that they would not have survived one severe storm. We dug down around the pole about eighteen inches and with a pointed instrument scraped out and away all the rotted wood; we then applied our antiseptic chemicals in a plastic form with a trowel, filling all the holes and depressions even with the surface of the pole. We next placed around the pole an especially constructed asbestos jacket that would resist the action of the elements, such as rain, snow, freezing and thawing. We filled in between the jacket and the pole antiseptic material in a powdered form, to the top of the jacket. We allowed the top of the jacket in some instances to remain open so that it received all the rain and snow that fell and which might run down the pole. In others we placed a cap over the top of the jacket. We were careful in mixing our antiseptics to use none that would cause the pole to become brittle and thus weaken it. We found that in all instances after a period of over six years, our antiseptics had completely sterilized the poles where applied and the decay was entirely arrested. In fact the poles were in as good condition as when the treatment was first applied. We carried our experiments further and treated a class of poles that had not been in the ground more than two or three years, the surface indications of which showed only slight infection, but the sappy portion had begun to scale and the cracks exhibited unmistakable signs of decay. We did not attempt to clean off the decayed portion of this class of poles, but treated them by placing the jacket around the pole and depositing between it and the jacket our antiseptics and then sealed and fastened the collar above referred to. The jacket on these poles was about eighteen inches wide, extending below the ground about fourteen inches, and above the ground about four inches. Upon examination of this class of poles six years after treatment they were found to be completely sterilized free from the effects of the bacteria and fungi. No signs of living fungi could be discovered under a powerful microscope.

We are fully aware that the success of this process depends very largely upon the question of expense. We have made some figures based upon our experiments which show that the cost is within the reach of all companies and can easily be paid out of the depreciation account and still leave a handsome surplus.

Suppose we take a plant of 5,000 poles costing $5 each, in the ground fully equipped. Their original cost would be $25,000. At the end of twelve years they will have to be renewed at a cost of $25,000. Counting interest for twelve years on the last $25,000 at $18,000, it would make a total cost for twenty-four years of $68,000. Suppose we take the same plant and apply the treatment. We find the original cost of the 5,000 poles to be $25,000. The cost of sterilizing them after they have been in the ground two years would be $1.25 each or less, amounting to $6,250. The interest on this amount for twenty-two years would be $8,250, making a total cost for twenty-four years of $39,500. It will be seen

then that the cost for twenty-four years without treatment would be $68,000, while the cost for twenty-four years with treatment would be but $39,500, showing a profit in favor of treatment of $28,500. It will be perceived that if the pole is preserved intact, with full strength for ten or twelve years by means of the jacket and chemicals, and it is removed or entirely gone, at the end of that time, the pole will be in the same condition to resist the fungi that it was when first treated, and will have its original strength and life.

Again in our calculations we have not taken into account the increased amount of trouble that always accompanies the use of old poles the last few years of their lives. This item of the maintenance account always increases as the poles grow older and weaker, and should be placed on the credit side, where the process is used. Then again, in all human probability, poles will be at least twenty-five per cent higher in value twelve years from this time. If that be the case, the cost of the new poles when they have to be renewed would be $6,250 more and the interest on this increased amount for twelve years would be $4,500, making $10,750 more to be added to the profits of sterilizing, or a total of $40,375 in twenty-four years.

In all candor we ask this convention of business men if this is not worth looking after.

The telegraph and telephone companies have been taught and led to believe that the life of a pole is about twelve years; they have been taught to believe that the decay at the ground line is inevitable, and the time of its usefulness cannot be extended. We have demonstrated that the life of a pole can be nearly, if not quite, doubled by the use of the above method of treatment.

I will add that Dr. Howard Jones (my coworker in these experiments) expects to publish at no distant day an account of his studies of the bacteria and fungi which cause the decaying telephone poles. The scope and technical character of his experiments make it impossible to give an account of them in this paper. —*Abstract of a paper read by H. P. Folsom before the Ohio Independent Telephone Convention.*

SHOULD TROUBLE MEN BE EQUIPPED WITH A TECHNICAL EDUCATION.

If I had been asked to confine myself to one word, yes or no, in answering this question, I would, without hesitation, say yes. But as the only limitations placed on my answer are my ability and your patience, I will endeavor to expound, expostulate, elucidate and explain my reasons for arriving at the above conclusion.

To begin with, the duties of a trouble man are to locate and remove trouble from lines, cables, telephones and switchboards. After the trouble is located, its removal will depend as much on his mechanical skill as on his technical education, but to locate the trouble is sometimes the harder part. In order to properly diagnose a case the doctor must know something of the nature of the disease and anatomy of his patient. It is just as necessary for the telephone doctor to know something of the nature of electricity and to have a knowledge of the general construction and "modus operandi" of the apparatus under his charge.

There are some who pose as trouble men who do not know the first principles of telephonic transmission and this is no argument against my position. Of course they know how to produce electricity; everybody knows that; all you have to do is to turn the crank. Such men destroy more apparatus than they repair.

Some of these men in time make successful trouble shooters. They get their education in the school of experience. This is one of the most popular schools in the country. Among its students are many bright, successful men and many dunces. It has no faculty and gives no diplomas or degrees, and only graduates its students at their death; yet tuition is apt to be high. All honor to the school of experience. The man who gets his education there—if he gets it—is as worthy as though he acquired it in a school of technology. Nevertheless my advice to young men that have an ambition to become telephone men is to equip themselves by taking a course in some good technical school. If they get to know too much for the position of trouble men their employer will no doubt promote them or fire them according to whether he places the same estimate on their abilities that they do themselves.

This brings me to the point, how much education should a trouble man have? And I would answer, all he can get. He never will know it all. He ought to have enough at least so that when a complicated case of trouble arises his knowledge will enable him at once to reason out the cause of the trouble and the remedy. He ought to understand the use of testing apparatus and know how to make all necessary tests. He ought to learn to first locate his trouble before he begins tearing things to pieces. He ought to learn his own limitations and know what to let alone. He ought to know what to do in case of trouble and why he does it. If he should learn something more than all this, he need not be alarmed, it will not hurt him any. But some may ask, "What is the use of learning a lot of things that we never use?" The same question might be put to any of the students in our schools and colleges. A certain professor in one of our colleges lately told his class he wanted them to forget everything he taught them as soon as examinations were over. He said education was not a mere accumulation of facts, but rather a training of the mind, a developing of the reasoning faculties, a broadening of the intellect. Nature has done much for us in giving us two hands; many wonderful things can be done with them, yet a fine tool placed in them will enable many things to be accomplished that could not have been undertaken without it. So also nature has done much for us in giving us a mind; many wonderful things can be done with it, but an education pushes back the horizon of its possibilities as the tool does for the hands. What is true of education in general is also true of a technical education for the trouble man. He can do things with it that he could not do without it; he is a better man and worth more to his employer because of it.

On the other hand, how often it is we see a young man with exceptionally bright talents along some particular line, yet so filled with conceit that he thinks that nature has done all for him that is necessary, and no one is more surprised than himself that he remains all his life in the ranks. He has refused to avail himself of the opportunities of education, and his ignorance has blinded him to his own possibilites.

I once knew a cvil engineer who quit smoking because he thought it tended to dull his mind. He said he could not afford any habit that would weaken his powers. Neither can a trouble man afford to miss any opportunity to add to his knowledge or increase his usefulness.. Yes, trouble men should be equipped with a technical education.—*Paper read by P. R. Crouthers before the South Dakota Independent Telephone Convention.*

BETTER TOLL LINE SERVICE.

I fear the time will never come when we will not feel a pressing need for better toll service in some localities in the state of Iowa, for on account of the rapid increase of toll business, lines that could handle all toll messages satisfactorily twelve months ago, are overtaxed to-day which causes a congested condition of toll service in nearly every part of the state.

The facts are, we live in an age of progression in all things and in nothing more so than in the telephone field.

The time has been when the farmer was content to ride to town with his family in a lumber wagon, using bed quilts for robes with which to keep warm, but times have changed as they rightly should, and now the farmer must have a covered carriage for the boy to take his sister out riding and if he has no sister, then some other boy's sister; there must also be a two-seated surrey and a fine, young team for the family at large to go to town and church, etc. Now there was a reason for this change.

First, the old lumber wagon and span of heavy horses were too slow and too much valuable time was lost in making the few short trips they were in the habit of making, and as their business increased their so-called trips increased also; hence they found it necessary to change from the cumbersome lumber wagon and heavy horses to lighter and easier riding vehicles.

The same condition holds good in telephony. There was a time when the old wood back transmitter, single pole receiver and grounded toll line were perfectly satisfactory to telephone users for with the aforesaid equipment we could talk fairly well to our nearby towns, and if we desired to talk farther some operator on the line had plenty of time to repeat our message for us and on account of this repeating process the line was used but very little and there was no danger of the same becoming congested, consequently if it took thirty minutes to get a message through it was the best we could do and no one could find fault; but like the case of the farmer, as our toll business increased we found the old way too slow and too much valuable time was lost by this repeating process and the necessity of more and better facilities for handling this ever increasing toll business and telephones better adapted for the required service.

The manufacturers have certainly done their part in giving us the solid back transmitter and double pole receiver, equipment second to none for long distance service, but however good the telephone may be, we found the grounded toll line too slow and too indistinct to satisfy our necessities and we again felt the pressing need for improvement.

The next step forward is the copper metallic line. We run one copper circuit perhaps and say, now surely our trouble will cease, but ah! how soon are all our hopes blasted, for some day as we step into the toll office we find the toll operator with from three to six messages lying on the table, and she, poor girl, trying her best to get the line just for one moment, but is informed that the line is busy. This shows a clear case of toll line congestion and causes us to lose many messages to our enemy, the Bell, which should and might be handled satisfactorily by the Independent companies.

What we need to-day is to discontinue the use of all grounded toll lines and place in lieu thereof copper circuits and more of said circuits in congested districts.

Of course, I know that it requires capital, labor and brains to build good, serviceable copper circuits, but Iowa, the best state in the Union, has plenty of each of these requisites and some to spare.

It is true that some of the Independent companies have done nobly along these lines, but a few companies cannot build the necessary lines for the state and we are so selfish that should they

offer so to do we would object to their crossing what we term our individual territory. This disposition is all wrong, for if for any reason we do not wish to cover our so-called territory with necessary metallic circuits, let us welcome Independent companies that will do so, extending to them the right hand of fellowship and help the good work along by renting or giving to them toll line privileges over our telephone pole lines.

You will notice that whenever the Bell's agent approaches an Independent exchange owner to induce him to become a sublicensee of the Bell, his great argument is the better toll line facilities he has to offer over the poorly constructed, grounded line in some localities, and in others the congested condition of the Independent toll service, and the facts are that this toll business presented in this light to the struggling exchange owner by the Bell agent (whether true or not) appeals to the whole five senses of his nature, and too often if he is not a deep, dyed-in-the-wool Independent, he makes the sad mistake of his life by joining his force with that of the enemy.

I say these things appeal to the whole five senses of his nature, which are hearing, seeing, feeling, tasting and smelling, for when he talks with his neighbor he wishes to hear him if he is at all interested in his business; he wants to see his business keep pace with the requirements of his patrons and in this way he hopes to be able at some time to taste of a few of the good things of this life, and he realizes that in order to do this he must feel a few honest dollars coming his way and he has no desire for the smell of brimstone which is liable at any moment to come from his patrons over poor toll line service.—*Paper by O. F. Blazier read before the Iowa Independent Telephone Convention.*

SHOULD INDEPENDENT AND MUTUAL COMPANIES CO-OPERATE.

I believe the telephone business has increased more rapidly than any other business. It has grown from the business man's convenience to the farmer's necessity. In 1902 the report of the United States census bureau shows that the state of Iowa had 710 exchanges, sixty-eight of which were Bell and 642 Independents. The figures submitted to the executive council for taxation purposes for the year ending July 31, 1905, show there are 138,818 Independent telephones and 27,260 Bell telephones. According to clearing house reports the farmers are among the largest users of telephones in the state, and through their demands the greater service developed. To the credit of Iowa she has twenty-two per cent or nearly one-fourth of the rural telephones in the United States.

I have been a member and director of our farmers' mutual company ever since its birth and feel interested in the farmers' movement, and know that farmer mutual companies in general over the state are not supplied with as satisfactory service as we. Possibly this is true because they themselves and the Independent companies operating the exchanges in the towns where they desire switching do not for the benefit of each other realize the necessity of the square deal plan.

One thing more than any other that is keeping the farmer and Independent companies apart is the inducements the Bell company is throwing out. A few years ago they were burning Independent telephony at the stake, destroying the property of any one who dared build a competing system and claiming that they alone had a right to the tree of life, but the law of justice prevailed giving other men the right to build and maintain competing systems which have outgrown the monopoly system five times. A short time ago they would not look at a farmer, they would not even give him a hearing, but somehow they have recently discovered that he is the backbone of the future telephone business as well as the backbone of the nation. Now they are breaking their necks to get that bone, they know their body can't stand firm without it. They are offering switching service at the loss of the entire cost of giving same and my farmer friend, who is not apt to think twice before he jumps, is apt to think "that looks good" and step in. But to me it sounds like this: "'Will you walk into my parlor,' said the spider to the fly, ''tis the prettiest little parlor that ever you did spy.'" Remember the tale?

We know the Bell's rates before they had opposition and where they have opposition now. Patrons are getting both telephones as cheap or cheaper than they were getting the Bell service alone. Should it be necessary to have two telephones to get the service? I say no. Then what is the solution? As the state of Iowa has about as many rural as Independent companies, let us set the example by uniting with the Independents on the square deal plan, working together as one Independent company and helping ourselves by helping each other, instead of striving for position to plant our field artillery so that we might knock the stuffing out of each other.

The Bell argument is that if we would connect with them we could talk to Boston, New York, etc. True, we can if we have money enough to pay the bill, but telephone service is not valued by the number of miles of naked wire we have at our disposal, but by the number of patrons in our immediate vicinity who have the same switching connections as we. If we will endeavor to work out the square deal plan that our state agent is promoting, we will establish a system whereby we can talk to each other from coast to coast. It may be as necessary for us to suffer a few inconveniences as it was to use the old flint lock of 1812, but Independent telephony will reign.

What is necessary for us to do to get together? First let all of us make up our minds to get together then stay together till we get together. Be fair with each other. Don't charge your farmer patron a rate that will make him feel sore every time he calls some one, he is the half of your existence. Farmer friends, don't ask your city exchange to give you the earth free. I know by experience that he can't do it and you will have better service if you don't get it. Don't ask for less than a ten cent rate between switching stations. He can't keep his system in shape and give good service for a less rate. Give him the assurance of getting reasonable compensation for his time and investment. Encourage an Independent long distance toll service, be willing to pay a reasoable rate for it and it will come. Then we will enjoy the fruits of the square deal plan and Independent telephony.

Should we co-operate and remain Independent, and why? This would seem like a foolish question to put before the generations that have lived under the banner of the Stars and Stripes that were saved at Bunker Hill, when the British yoke was thrown off forever; when free thought, speech, church, press and liberty were proclaimed; government for the people by the people, nor will the American people ever submit to a monopoly or soverign rule. Then why should Independent telephony mean less than telephony by the people for the people, when all the companies can meet and adjust their differences? We must have a uniform toll and rental rate that is reasonable to the patron and will insure the investor proper compensation for his time, investment and maintenance of a first-class service.

There is one thing sure if we do not co-operate and maintain Independent telephony, we will be dependent on a monopoly system for our service and we know what that means. I hope the farmers' mutual and Independent companies will grasp the situation and take hasty steps to work out the square deal plan, which if carried out will solve the problem of one service, one telephone.—*A Paper read by William Crownover before the Iowa Independent Telephone Convention.*

THE TRAFFIC ASSOCIATION.

In the work of the traffic association this year there were no very decided changes from our work of last year. The amount of business has shown a very gratifying increase each month over the corresponding month a year ago and acts as an automatic register, which shows what companies are gaining and how much and also what companies are losing and how much. Needless to say there are very few of the latter class.

At a traffic meeting held June 15, 1906, I made a report to the traffic committee, showing the work which had been accomplished during the fiscal year, which closed May 31, 1906. In this report I stated that during the year the association had cleared 212,524 messages, an average of 17,710 per month; the amount of traffic cleared being $53,850.79, an average of $4,487.81 per month.

The cost of clearing our first year's business was two and three-tenths cents per message or nine per cent of the cost. At the Battle Creek convention I predicted the cost for the second year one and two-thirds cents per message. The actual cost, however, was $3,005.67, which equaled one and two-fifths cents per message, which is considerable less than five and three-fifths of the gross interchanged toll line earnings.

At a previous committee meeting, Mr. Howard, chairman of the auditing committee, gave a report on the check error account which showed a balance not accounted for of $2,465.64; the cause of this large balance being that certain companies were totally ignoring their error reports as they were sent from time to time. Action was immediately taken which resulted in the balance becoming less and less until at the close of the fiscal year, May 31, 1906, there was only $1,253.61 to be accounted for.

Out of a total of $10,843.20 check errors, which have been accounted for, $4,886.78, or forty-five per cent have been acknowledged and pro-rated. So far for the third year we have cleared seven months' business with a total of 145,370 messages amounting to $35,496.87. Taking this as a basis we will have cleared at the close of the year business amounting to $62,566.08 or a total of $9,000.00 more than the preceding year. Out of this $36,496.87 we have cleared $2,666.15 which has been the result of our check error work and has been pro-rated to the companies.

Michigan, with its 100,000 telephones, 10,000 circuit miles of toll line, handled during the year 1906 about $270,000.00 worth of toll business; twenty-two per cent of which will pass through the clearing house. For the fiscal year of 1907-1908 the indications are that the amount of business will be greatly increased, because of the development which has taken place in all parts of the state. The proposed development of the Home Telephone Company of Detroit and its long distance company, the Peninsular Telephone Company, I believe will add directly or indirectly about 25,000 telephones to Michigan's total. The development of the property of the Southern Michigan Telephone Company will probably add several thousand more, which, of course, will cause

more trunk toll line circuits and more local and interchanged business. The connections for Michigan-Indiana business, which we have every reason to believe will soon be completed will enable a great deal of interchanged business between the two states, which has heretofore, of necessity, been turned away; and as soon as we receive the Chicago connections, which are now promised us there will be still a great deal more. I merely mention these few indications because the larger the amount of business handled by the traffic association the less will its cost per message be.

The reports of the several companies have shown a steady improvement throughout the year, first, in getting the reports to the association on time; second, the routing and third, the accuracy of reports. The improvement on accuracy of the report is shown in the amount of toll business as greatly increased, while the amount of check errors has remained about stationary, if anything has decreased somewhat. In regard to the routing, we still find considerable confusion each month; one company reporting business to a certain point via a certain route and the receiving company reporting the same business by all together a different route, which makes it hard for the association to know just what to do. In most every case we have taken the originating company's routing, but in some cases the difference has caused a question to arise in our minds, which after investigation has caused us to change the routing on the reports. We would therefore urge that every company give this part of the work as much attention as possible.

In closing I wish to thank every company for the co-operation and help which they have given me so freely at all times during the past three years and to urge upon you that you are welcome to examine the records of the association at any time you may desire. We are always glad to receive friendly criticism or suggestions.—*A Paper read by W. S. Vivian before the Michigan Independent Telephone Convention.*

ECONOMICAL FINANCING.

The economical and successful financing of the modern telephone plant is a matter which should be considered carefully and with a view to the future by all who engage in the business, for in the careful building of the financial foundation on which the superstructure of the business is to stand depends the ultimate success of the enterprise. Without this adequate preliminary financial preparation the chances are strongly against the success of the business, for it is a peculiar fact that the larger the growth of the telephone exchange, the greater the cost of maintenance per telephone, bringing with it an ever increasing demand for capital to carry it along.

Before engaging in the construction of a telephone plant the ground should be examined carefully as to what will be required for present needs in the way of equipment, and in addition to this due consideration must be given to the probable growth of the future. Having determined as accurately as possible the size and cost of the plant which will be required for present service and also what may be necessary in succeeding years, it is a wise plan to incorporate for at least double the amount which it is planned to put into the plant at the start. On the organization of the company it is well to distribute the stock as widely as possible among the local investors. Every stockholder is a friend of and active worker for the company. Each man so interested exerts his influence in its favor.

The fifty per cent of the stock not sold should be kept in the treasury with the view of being used if required for additions and improvements to the plant as the growth of the business demands.

As an additional means of financing the company, it is well to issue bonds to the amount of about half the stock issued, and so far as possible these bonds should be placed with local investors, thus further strengthening the local feeling in favor of the company. These bonds should bear six per cent interest and may be made to run the usual length of time for such securities.

In the construction of the plant none but the best and most approved telephone appliances should be used. In the long run the best is always the cheapest, and with the plant equipped in the modern manner, the service which is rendered to patrons of the exchange will be far more satisfactory and freer from complaint than if a cheaper and a less approved apparatus is installed.

Rates for service should be placed at a figure that will allow the company to operate with net annual earnings of from fifteen to twenty per cent. Of this sum the stockholders should be paid semi-annual dividends of three per cent and the balance should be used as a fund from which to pay extraordinary repairs, such as are occasioned by sleet storms and other unfavorable weather conditions, and with which every telephone company is called upon to contend. From this fund must also be taken renewal repairs and it must also carry the item of deterioration, it being a well known fact that the life of the average telephone plant does not exceed fifteen years.

In this paper it is not my province to enter into a discussion of detail management of the company, but so far as this branch of the business relates to the financing of the plant I would say that if the labor of the men who organize the business and who make the outlay is to be successful and the stockholders are to have a satisfactory return on their money invested, there must be a most careful and practical management on the part of those entrusted with the daily work of the plant. The manager must be a man of ability and one who has a thorough knowledge of every detail of telephone construction and management. He must select his assistants with the view of getting the best service and hold them to strict account for the conduct of their various departments. In the business office a complete and systematic, yet simple, system of accounts should be kept, from which regular statements showing the condition of the business and the amount of business transacted, with its receipts and expenditures, may be made. The matter of collecting quarterly rentals should be followed up closely. All telephone rentals should be collected quarterly in advance and all toll line charges should be collected each month. In short, the auditing department of a telephone company could be conducted along clear cut, well defined business lines.

One other point suggests itself to me and that is, if Independent companies are to make a complete success of their business and hold the field against the encroachments of trust telephones, they must devote special attention to the toll business, extending their toll lines in all directions, making good connections with other exchanges, and covering the field so thoroughly that there will be no opportunity for competition. These toll lines should be built in the best and most permanent manner, using copper whenever possible and certainly on all main leads. Every effort should be made by the management to give the public a prompt and satisfactory toll line service, and in this, as in all other matters affecting the common good of the Independent companies, they should work harmoniously together.

If the telephone company is given careful thought and planning in its preliminary financing, and its operation is conducted along the business lines which I have indicated, coupled with an intelligent effort to secure new business and to take care of that which is in hand, the success of the enterprise is assured from a financial point of view.—*A Paper read by A. T. Averill before the Iowa Independent Telephone Convention.*

FAIR EXCHANGE VS. FREE EXCHANGE.

Is the fair exchange plan, as used by the Blackhawk Association, more profitable to the farmer company than free exchange, in point of service, finance and otherwise? We will first endeavor to define fair exchange and free exchange.

What is fair exchange? Our definition is equal or proportionate division of tolls for messages transmitted over the lines of two or more companies, between or among said companies. To illustrate equal exchange we will take for example our Farmers' company exchange at Finchford and the Corn Belt company's exchange at Cedar Falls. We have a toll line connecting the two, each company having built and owning one-half of it. All tolls for messages transmitted both ways over this line are equally divided at the end of each month between the two companies.

This is fair and equal because each company owns one-half of the line and performs one-half of the service.

Proportionate division of tolls may be classed as of two kinds: First, between immediate exchange of two companies, and, second, among several companies over whose lines the messages are transmitted. To illustrate the first: The Corn Belt Telephone Company owns all of a toll line connecting our Finchford exchange with its Waverly exchange. All tolls for messages transmitted both ways over this line are divided proportionately, the Finchford Mutual Telephone Company receiving one-fourth because it does not own any part of the toll line and the Corn Belt Telephone Company three-fourths because it owns all of the toll line. Again, the Finchford Mutual Telephone Company sends messages to Des Moines or to some other point beyond our immediate exchange. All tolls for these messages originating with Finchford are divided proportionately, Finchford receiving one-fourth of all out tolls and the other comany or companies three-fourths, each other company receiving its proportionate share. This in our part of the state we consider fair exchange.

Free exchange, what is it? Briefly, it is talking from one exchange to another without paying a direct toll. Notice the words "direct toll." We will try to explain them later on.

Financially there is no comparison between free exchange and fair exchange. Fair exchange gives to every company, large or small, an income which free exchange does not. It puts money into the treasury and helps greatly to pay expenses which must come to each one. It adds life and interest to the business of every company, creating independence and helping to place them upon a substantial foundation for growth and progress. No business can be successfully transacted upon a free basis, not even the telephone business. There must be some source of income to meet expenses. In the telephone business the fair exchange plan gives one important source of income which every company needs, and should and may have. Here let us emphasize this one important fact, that we must, or every telephone company must have an income, and that the toll business between each and every company on the fair exchange plan is of vital importance to the suc-

cess of every company as well as to the success of Independent telephony throughout our country.

The successful farmer well knows that he cannot conduct his business without expense or without some loss, and wisely provides means to meet them. So also should every telephone company provide means to meet expenses and make up losses, and in connection with this let me say: Consider well the fair exchange plan. It will please you, not only the large company, but the small company as well. It cannot fail to bring us all into right and pleasant relations and unite us in one great family whose home is our country. Harmony, peace and good will to all are three important factors in the progress of mankind. We have these in Blackhawk and immediately surrounding counties since we adopted fair exchange.

In speaking of free exchange we wish to say that our company started out with a strong free exchange idea. We thought everything ought to be free after building the exchange. We did not then know that it costs to maintain an exchange even after it is built. Personally, I clung to the free exchange idea for some time or until something better was offered, that of fair exchange. By this time we had learned that an income was needed to keep up the exchange, and having attended our district association meetings and become acquainted with our neighboring telephone companies whose representatives were advocating the fair exchange plan, we readily adopted it.

Financially and from a business standpoint, so called free exchange in general is a failure. It gives no income and, in general, unsatisfactory service. It is unfair, because one man pays just as much for sending five messages as another man does for sending twenty or more messages. How does it come that we pay for messages when we have free exchange? We told you before that free exchange was talking from one place to another without paying direct toll. However, an indirect toll is paid in the form of assessments which are made to meet expenses. Do you call this free? An assessment of one dollar per member is made for expenses. Some of the members have used the lines once perhaps, while others have used them ten times, but the former pay just the same for one message ($1) as the latter do for ten messages ($1). Do you call this fair? The same expenses come to every company, whether adopting so called free exchange or fair exchange, and let me impress upon your minds the fact that the fair exchange plan is far ahead of the free exchange or assessment plan, and especially so to farmer companies. Our own farmer company at Finchford has tried both plans, first free exchange, and the last year and a half fair exchange. Since adopting fair exchange we have had no assessments and we have plenty of money in our treasury, whereas before we had none. If our company wishes to make any improvements to better its service (and it is not in any rut) it does so at any time and is not obliged to beg its patrons for money as it had to do with free exchange.

In regard to service a well equipped exchange, which is always possible with the fair exchange plan, will give far better service than a poorly equipped exchange too often found where free exchange prevails. Let us sum up free exchange in the following words, which we give you from our own experience: Lack of funds, poor equipment, poor service, overloaded trunk lines, discontent, lack of best interests of the company. My farmer friends, if there are any of you here to-day who have free exchanges, we want to recommend to you the fair exchange plan. When you go home from this convention, talk it over with your people and your neighboring companies, if any there be that are not represented here to-day, and endeavor to secure its adoption, so that unbroken toll line connections may obtain throughout our state on a fair and practicable basis.

To any other Independent company, large or small, we recommend also the fair exchange plan, if you have not already adopted it. It seems to us that it is the best plan upon which we can all unite to form a complete network of telephone connections from north to south and from sea to sea. Let us remember that the telephone interest of each company is not alone within its own border but far beyond, and that every company desiring to aid the Independent telephone movement now in progress should so adjust itself as to meet the most practical conditions as they arise.

Let us all stand together for Independent telephony. Let us give to one another the hand of friendship and good will, adjusting any differences that may have arisen or that may arise at any time, in a spirit of fairness, and with kindly consideration. Life is what we make it, and so is the life of every organization what its members make it. If we wish Independent telephony to grow, if we wish it to prosper to its fullest extent, each one of us must make its interests our interests. If we do this success will crown our every effort; if not, our efforts will be put forth in vain and little will be accomplished.

In business life as in the individual life we must go up or down; we cannot stand still. It is the eternal law and we cannot change it. Let us all so conduct ourselves in our relations with one another, and put forth our best efforts, that the tendency of Independent telephony will be upward, and that peace, harmony and success shall be ours.—*A Paper read by G. A. Evenson before the Iowa Independent Telephone Convention.*

IMPROVING TOLL LINE SERVICE.

We believe it a safe assertion that no branch of the telephone business has been considered so much a matter of course, looked upon so much as something that would follow as a natural result, as the toll business. Despite the fact that all recognize it as the harvest after seed time, the profit getter, no department has been left to shift for itself to the same extent. We do not mean to imply that no attention has been paid to the promoting of the toll field, but we do mean that it has not had the same thought and attention that other branches of the business have had, the natural results of which have led to a condition which to-day demands serious thought from our best minds.

When we consider the heterogenous mass which makes up the fabric of our system throughout the state, we are forcibly reminded of the old saying that "no chain is stronger than its weakest link." We are also compelled to acknowledge that we have a few weak links in our chain. It is exceedingly fortunate for many of our companies that such a large percentage of the toll business is purely local. The results might have been disastrous if this were not true.

The time has now come, in fact we have passed the point some time ago, when the toll business in its broadest sense needs our attention. Our efforts to-day should be directed to the upbuilding of an adequate system for the handling of a large volume of through business. With the successful accomplishment of this object, each company will have inevitably and automatically built up a local system that will much more successfully take care of the present business and afford sufficient capacity for the natural growth sure to come.

With the present trend of business we do not believe it possible to provide more lines than can and would be used to advantage for toll purposes. It would almost seem that the parable spoken at the seaside twenty centuries ago had direct application to our business, when the great Teacher said: "For whosoever hath, to him shall be given, and he shall have more abundance. But whosoever hath not, from him shall be taken away even that he hath." The literal application of the parable is not far to find. If your toll facilities are up to date and good in every particular, people are mighty glad to avail themselves of their use, but poor service quickly costs you your business. There is something more to the toll business than simply connections between towns.

One of the greatest joys of our boyhood was to watch the gathering of the waters at the foot of the hill when spring began to throw off the cloak of winter. The glorious sun would start a rill here and another there, and as they would work their varying course through the fields, being constantly fed by other streams, finally finding entrance to the brook, now banks full, it was an interesting sight. The lessons learned at the brook side have never left us, and in later years their applications have often reoccurred in thoughts of the similarity to our business.

The little message from the obscure hamlet to the village makes it necessary for the message from the village to the town and thence to the city. Like the trickling stream of water, the first successful course opens a channel for the larger and ever increasing stream. We said at the outset that the toll business had been taken too much as a matter of course, too much as something found. That as a principle is wrong. The possibilities of the toll field have scarcely been opened. We believe if it is carefully studied and judiciously managed, it can be made a veritable mine of wealth. What condition in the affairs of men can you imagine, when the toll facilities will not be of inestimable value? Absolutely none. In the time of prosperity they are needed. In the time of adversity they are needed still more. All this but leads to the main question. There are two paramount things needed to bring about an improved toll line service. First, system: second, facilities.

With a uniform system of operation, it would be possible to do at least one-third more business with our present facilities. With few exceptions, no great attention has been given to any special methods of handling the toll work. The result is that one through message is very likely to pass through so many different methods of handling that, had it a head, it certainly would become bewildered. One poor system, universally adopted and developed, would give far better results than several good methods all dissimilar. Of course this is no argument for a poor method, but it is strong argument for uniformity. A uniform method will accomplish many results. In the first place it will do for the toll business the very thing it has already accomplished in the construction field.

Necessity is the mother and uniformity the father of our business, and our association is the healthy child of this union. The demands of the business very quickly made it apparent that we needed education in the field and it has been the office of this and kindred associations to furnish it. We as owners and managers meet in conclave as frequently as may be, to discuss the best methods of our business in general, teaching each other the better ways of getting contracts and franchises, building lines and exchanges, but how many of us have ever held schools for the in-

structing of toll operators here or at home? It is our opinion that right here lies one of the greatest of our duties, and one that is calling for this association to perform. This association should appoint a committee to perfect and adopt a toll system. They should appropriate sufficient funds to carry out the work and should then see that every member of this organization adopts and lives up to the plan.

We believe this plan could even be carried farther with success. A system that carried with it a competent paid traffic manager, who should have control of operating methods in the toll field of every company that is a member of this association, whose salary should be paid by an equitable assessment based upon the toll earnings of the several companies, would be an investment which would pay large dividends.

So long as we move as separate units, we can accomplish no great things in the toll business. A uniform system with the necessary machinery to work it and enforce its laws is the only solution of the greater problem. When you have this, the second great requirement, facilities, will follow as the night follows the day, because it must. It will then be possible to go into the toll field and develop the business. This will bring to the surface an equitable method of handling coupons and make it an object to push that branch of the business.

While Michigan is rich in the number of its Independent companies and its local development, it is poor in toll line facilities. There are but two companies in the state which devote their energies to toll business, and one of these is in its infancy. As a result, interstate business is almost an unknown quantity. Every through line is loaded 'way past its greatest capacity. No trunk line is left to the control of even its two ends, but must also be subject to the behests of several junction points, each of which is clamoring for it with the persistency and artfulness known only to an overworked Independent toll operator.

Seventy-five per cent of the toll business of the state handled by the Independent companies must pass through junction points where the operators are also expected to care for anywhere from 100 to 250 local subscribers. Every toll operator is a small sized autocrat, clothed with the power to tie up business that may and does mean many dollars to connecting companies, honestly working on the assumption that the business of the people who pay her salary is of paramount interest.

A brief resume of the present conditions induces the query of not how much we can do but how in heaven's name do we do so much. A little study of the conditions as they exist only lends force to the argument for a better direction of our energies. Well directed team work on the part of our operators would work wonders. A few short lines to trade and junction points, concentrating the switching and putting the management of lines into the hands of better trained and better paid toll operators would work a miracle. A united effort on the part of the more able companies looking to helping the smaller ones to improve their facilities and work on a uniform basis would pay back an hundred fold on the investment.

This, gentlemen, may be a radical theory, but it has never yet been conceded by enlightened man that we are not our brother's keeper, and certainly it has been our providence many times and in many ways to keep our brothers in the telephone business, and we are not sure that the rule has not often been stretched to include cousins once removed. We do not pose as being competent to bring order from chaos, but this we do know: Nothing has ever yet been accomplished without the first step; therefore we say, do something. Do it concertedly, and DO IT NOW.—*A Paper read by H. T. Clough before the Michigan Independent Telephone Convention.*

IMPORTANT LESSONS IN RURAL SERVICE.

The needs of the people in the small towns and in the country were never given consideration by the once great and only telephone company, the Bell. The farmers and small merchants were not considered a factor to any considerable degree in the business world a score of years ago, when the telephone was first introduced to the people, and the great monopoly was a monopoly in every sense of the word.

At that time only the well to do in thickly populated districts were able to lease the forerunner of what was to be one of the greatest conveniences and time savers the world has ever known. What a change! To-day the telephone is in every hamlet, and every merchant and every farmer in the rural district is able to enjoy its benefits. The credit for all this will probably be claimed by the Bell telephone company and its sublicensed "tubs of water." After all, a claim of this sort by the Bell people would be nearer the truth than usual, for there is no doubt about their being the pioneers; but where? Not in the rural districts. There wasn't sufficient prospect of their getting their money back to warrant the expenditure in these locations; so, of course, it was not necessary to develop this class of business so long as they had a cinch; and until the Independents or the people themselves took the matter up no effort was made in this direction.

We in the Independent field have had a few lessons to learn, however. There was a time when we thought a farm line ten miles long with twelve or fifteen telephones connected, at a rate of twelve dollars per year, was a good paying proposition. There was a time when we thought (as the farmer does now) that all the expense attached to the business was the installation of the telephone and the salary of the central girl. To our credit be it said that we have seen the folly of such reasoning, and most of us are looking at the matter as a business proposition, and giving every situation cool and deliberate consideration before going ahead with the work.

To most people who have been in the telephone business for some time, the suggestions made herein will be received with a "I know that," "Them's my sentiments," etc. However, in our midst maybe there are some who are interested, but not actively, and who still lean toward the notion that small poles and cheap construction are good enough for this class of business.

First of all, our country districts are becoming more thickly populated ("they are not all going west"), and those who are now living in them are becoming educated to having things handy (for that matter, this is the tendency all along the line), and because of this, no telephone company has built a line that the requirements have not exceeded their expectations; and, this being the case, most of the companies are up against the proposition of building new and heavier construction before the life of the present construction is half over.

Many of the more experienced telephone men have found it advisable to make a map of the proposed line, showing the actual and the probable subscribers and counting upon seventy-five to ninety per cent of the probable subscribers being actual subscribers before many months have rolled by. Careful estimates of the cost of construction should be made before proceeding to build. Materials should all be on the ground and telephones ready to install before anything is done toward actual work.

Arrangements should be made in the country for board, etc., before construction crews are sent out; the foreman should know just what is going to be done and how, and above all use the best of materials and workmanship—it is economy in the end.

Contracts should be taken which should state distinctly what service is to be given and for how much. Nothing is so unsatisfactory as doing business with the general run of farmers when there is no record of what is required of the subscriber or company.

It is surprising how much easier it is to make your collections when you can show the farmer you know all about what service he has had, for he is usually a procrastinator in paying his telephone bill, and when he is in arrears and you have urged him pretty hard to pay up, he is liable to come back with a cry of poor or unsatisfactory service.

To show him a record of the condition of his line and telephone has a very quieting effect, and it is important that such record be kept for this purpose, if for no other (although there are many others, like keeping in touch with the work of your trouble men).

Some situations make it necessary that the company require the subscribers to build their own pole lines. From experience I would suggest that under no circumstances would it be advisable to build without a contract giving the company exclusive possession of these poles upon the placing of their wires upon them, as in many instances the subscriber feels he owns these poles and should be paid for them, should you wish to take on other neighbors just beyond.

There are few companies that are making the mistake of allowing their subscribers the privilege of free county service, but to those that are and to those that have a mind to I say "don't." I happen to know of a locality where this class of service is in practice and has been for so long that the people have become educated to it to that extent that they cannot see what use they would have for a telephone if it were not for the county service.

You have no idea what it means unless you are actually doing it. Recently my attention was called to the matter and I was surprised to find that there were over five hundred conversations a day on a system of slightly over 1,600 telephones. That means 150,000 a year of 300 days, and at ten cents each would prove a handsome income. Of course the ten cents would cut out about sixty to seventy-five per cent of the connections and you would have circuits enough to handle the business without being forever subject to the kicks of the business man who thinks the operator's "Line is busy" is simply to keep him from talking. Free county service is an evil and one of the greatest ones there is in the business.

In closing I want to add that I find in my experience the most important thing to keep in mind is to have no misunderstanding with your subscriber as to what his duty is when you have performed yours. He must be made to understand that it takes money to operate a telephone plant and that no matter whether the telephone is used little or much it has been at his service all the time and you are entitled to your money promptly and as agreed.

Prompt pay puts you in position to give prompt service, and these are, to my mind, the all important features in the telephone business.—*A Paper by Thomas Bromley, Jr., read before the Michigan Independent Telephone Convention.*

THE MODERN TELEPHONE SOLICITOR

An Article Giving Practical Hints How to Obtain New Business

By Royal Matlock

THE man at the head of the contract department who is able to keep abreast of the demands of telephone users to-day for unique arrangements for the consummation of some pet idea, has to lie awake nights revolving the suggestions over and over in his mind in the effort to make them practical. We can all remember when these same people hesitated about having even one wall telephone installed, yet now they are constantly demanding greater conveniences, up-to-date appliances, and novelties galore.

In one of the northwestern towns there were recently installed portable sets on thirty odd dining tables in a restaurant. Above these sets hang small electric bulbs and colored shades harmonizing with the general color effect of the room. If the Woman's Club gives a luncheon they have pink shades, on St. Patrick's Day green ones can be supplied, and so on. Instead of a bell a light is displayed on the marginal disk, when some one at the table is wanted and it is operated by the head waiter pressing a button at the entrance. So short has been the time, that it seems scarcely a day since it was necessary to use a great deal of patience and argument to secure a residence contract, yet in the larger homes we now find telephones installed in the basement laundry, kitchen, living room, housekeeper's room, and the private apartments of the mistress as well as the stable, so that "my lady" issues her daily instructions to the housekeeper, orders up her breakfast, or calls for an early drive before leaving her apartments. These, together with the various systems of private branch exchanges in hotels, offices and factories, seem to relegate the old time house to house soliciting into the past, as was recently demonstrated in the state where they have to be "shown." A solicitor answered a want advertisement in person, and, on being asked if he had had experience in soliciting for, and thoroughly understood, private branch exchanges and intercommunicating systems, admitted that the only knowledge he had of them was secured by reading articles in telephone journals. It is not sufficient that the manager and the general contract agent should be familiar with these systems and various innovations, but each solicitor, outside of making estimates, should thoroughly understand and be able to figure on any of the ordinary systems, especially in cities where the opposition is strong, for if there is anything that will spoil a prospect quicker than all others, it is the remark, "I'll see So and So and let you know later." True, the time is not past for house to house soliciting, but the day is already here when in addition to the qualifications required for this class of work, a solicitor must be equipped for handling the latest appliances and be able to explain and figure on any proposition presented to him.

Among the latest uses to which the telephone has been put, its assistance in solving the servant girl problem has attracted much attention, especially in domestic circles. In Minnesota an apartment house is fitted up with a large general kitchen in the basement with tray elevators running to each apartment. In the morning the wife calls up the manager of the kitchen over the intercommunicating system, gives the family breakfast order, and in a few minutes lifts the steaming viands from the elevator to her table. Of course, there are numerous details connected with the management of this general kitchen, but they are nothing compared to those existing before "Bridget" ceased to rule. The canvassing for common business, rural soliciting, and calling upon the grocer who does not yet see the necessity of a telephone will always be necessary, but the strides of telephony in the last ten years—and even in the last five—prove that it is necessary to anticipate the needs and wants of the public in advancing ideas and suggestions of an unusual character as well as assisting in maturing half-formed ideas of their patrons.

A solicitor was sent to a town of seven thousand population where the foreign speaking element predominated. In canvassing he found it impossible to reach these people solely because they could not speak English. Instead of leaving the territory he induced the management to secure a relay of operators who could handle this class, secured an interpreter to assist him in again covering the town and was rewarded with over three hundred additional subscribers. This plan was not original, as it has been employed on the western coast for some time, but it is doubtful if ten per cent of the solicitors to-day know of this. We are learning, too, that, like the commercial traveler of old, who spent his time in running down the other fellows instead of presenting the merits of his own goods, our interests are best advanced by allowing the opposition to do its own advertising and using the time allotted us in demonstrating the advantages of having a telephone and directing attention to the principal points of merit of our service, instead of knocking the other company's business.

We do not, as yet, know just what effect, if any, recent court decisions relative to contracts signed for one or more years, in which it was held that collection could be made only for the time of actual service, will have on the contract department; but, in the opinion of the writer, it will, if the law is generally so interpreted, lead to the necessity of making a charge for installation, which ought to have been done years ago. Take, for example, a case when it is necessary to set several poles and string several spans of wire in order to reach a subscriber at a cost equal to a yearly rental. If the service is discontinued in two or three months, what recourse has the company with no installation charge and a worthless contract? Then, too, if these decisions are upheld, this same subscriber can later demand service, the only stipulation being that he must pay in advance for service, and this also applies to those who formerly were subscribers but are in arrears. In such matters as these the solicitor of to-day must be informed to aid him in handling parties who are in arrears or new subscribers who do not, from a financial standpoint, "look good." There is one company in southern Missouri which has been charging for installing for about three years, and while the charge ($1.50) does not cover the entire cost of labor and material, it relieves the company of a part of this expense, and assists in educating the public up to the fact that the material used in installing is practically worthless when removed even if used only for a few months. The company has made this charge in the face of very strong opposition and increased the rental list from 789 to over 1,400 in three years, which proves that this plan can be successfully carried out anywhere with proper representatives among the people to explain and justify the proposition. A solicitor who is qualified to meet and satisfactorily handle these and numerous other conditions is the kind in demand to-day, and upon him and his efforts rest largely the success of the company employing him.

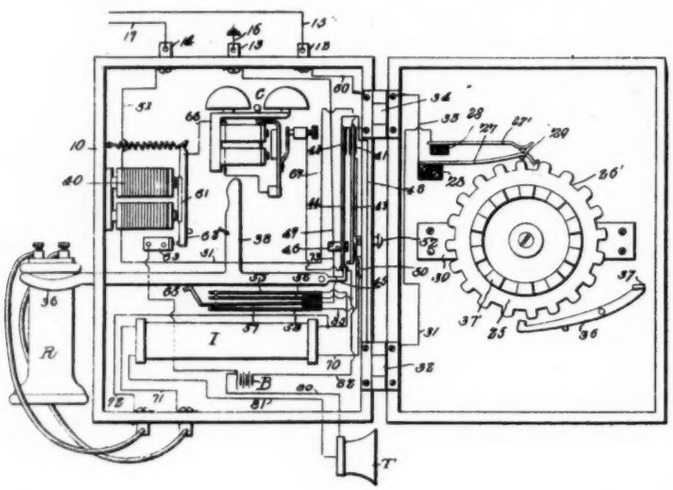
DIGEST OF TELEPHONE PATENTS

By Edward E. Clement

847,305. Telephone Set. Atwood. This set is used on shipboard and utilizes a hand telephone set comprising a transmitter and a receiver connected together with a flexible connection to the box so that the user may have considerable freedom of movement while using the instrument. The transmitter when not in use engages in a cup-shaped socket inside of the box and a lug on the receiver hooks under a lever which operates the switch contacts. Patent assigned to the Western Electric Company.

847,316. Telephone System. C. L. and T. P. Carr. In this system each subscriber is provided with a signal which indicates to him that his line is cut out and that all other stations are similarly cut out except the two which are in use. The operator is provided with means for signaling any one subscriber to the exclusion of all others and to synchronize the controlling mechanism of all stations. Patent unassigned.

847,355. Signaling Apparatus for Telephones. Munson. The central office is provided with a register adapted



to operate on a number of impulses and a sender is used at each sub-station having a disc with a notched periphery. A ratchet wheel on one face thereof is controlled by an arm carried on the receiver hook so that it is necessary to replace the receiver or to depress the hook before the device is operated. Patent unassigned.

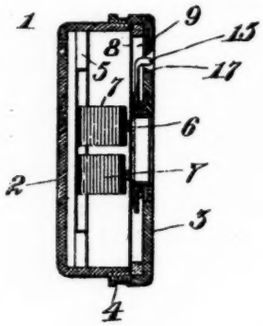
847,356. Automatic Telephone Switchboard. Monson. The calling circuits of this system have multiple connections with a series of independent magnets arranged to control independent contacts, one for each sub-station, and means are provided for bridging the multiple circuit when anyone magnet is energized and thereby preventing the energization of the remaining magnets and locking out other sub-stations. Patent unassigned.

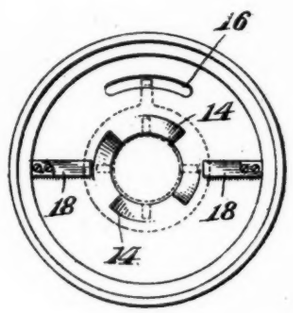
847,367. Telephone Switch Operating Mechanism. Potter. This device comprises a revoluble shaft with a spiral spring surrounding it and adapted to return it to normal position. A laterally projecting stud carried thereby operates the switch spring and an arm at each end of the shaft is engaged by the extension of the switch hook so as to revolve the shaft and work the switch contacts. Patent unassigned.

847,385. Telephone Trunking System. Webster. This system improves on the Dunbar two-wire type and uses three or four wire type terminating at the A office in lines of the Dunbar type. The A circuit is provided with bridged batteries at the end of each trunk with one pole grounded. The relay at the incoming end of the trunk is normally legged to ground from the tip side, the metallic circuit of the trunk, being at the same time open, and a relay responsive to current in the line when the called subscriber answers, disconnects the trunk relay and completes the metallic circuit at the outgoing end of the trunk. Patent assigned to the Kellogg Switchboard & Supply Company.

847,691. Telephone Attachment. Rector. In this device the inventor arranges a speaking tube attachment so that the receiver thereof may be placed in engagement with the ear opposite the one against which is placed the magnetic receiver. An attachment to the magnetic receiver gives a sort of megaphone effect and diverts part of the sound into the speaking tube. Patent assigned to himself, Daniel A. Sprague and Arthur P. Smith of New York.

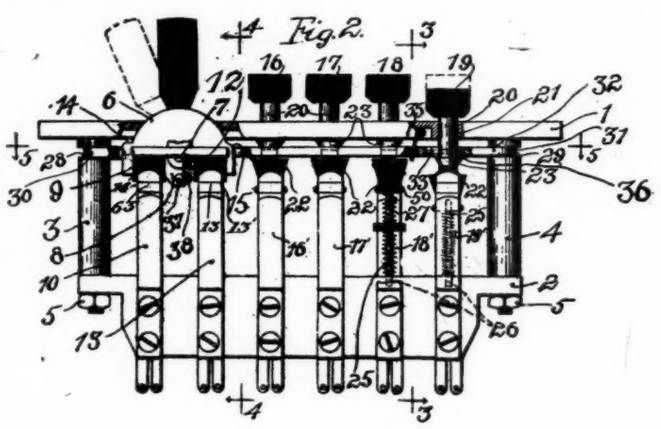
848,073. Modulating Telephone Receiver. Turner. A plurality of adjustable cam lugs are arranged beneath the





diaphragm and are provided with dampening pads arranged so that they may be made to press more or less effectively against the diaphragm and thereby regulate the sound produced. Patent unassigned.

848,283. Switching Device. Birsfield. This is a three-position ringing and listening key, and is practically the

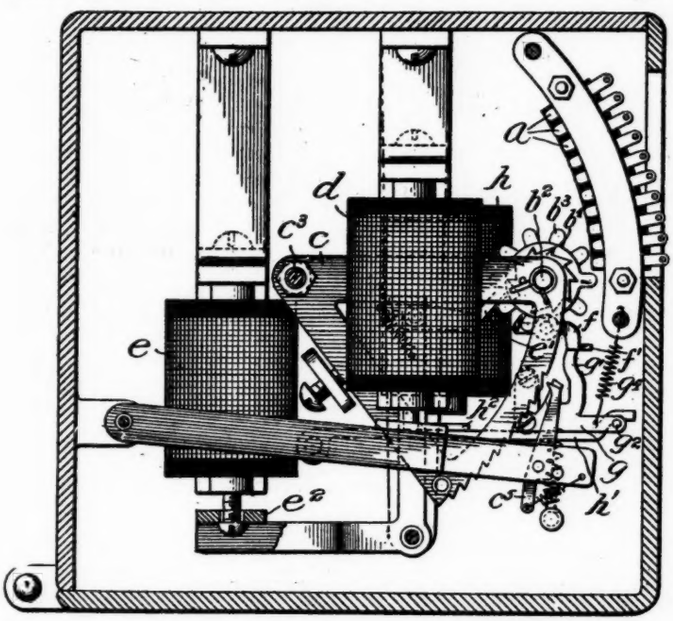


same as keys of this type now in commercial use, but employs an operator's listening key, which, when operated,

throws the ringing keys back to normal. Patent assigned to the Stromberg-Carlson Manufacturing Company.

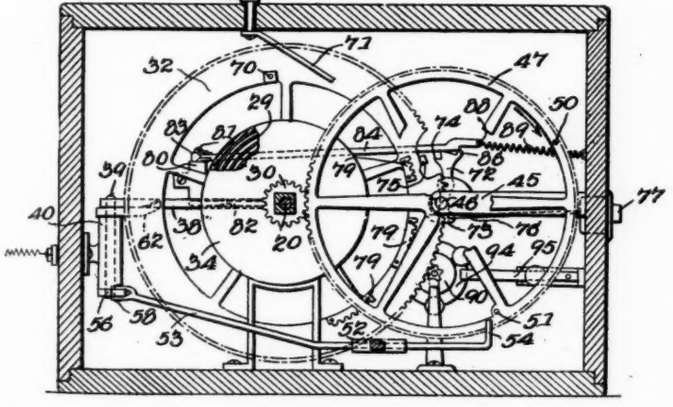
848,120. Automatic Trunking Device and Selective Signaling Apparatus. Monson. This system employs an automatic switch connected in multiple at the switchboard and controlled by any one of the subscribers in a particular group. The switch also operates to cut off communication between all of the other subscribers and the trunk line. Patent unassigned.

848,398. Automatic Exchange Selector. Roberts. A plurality of contacts arranged in arc rows are so arranged



that a star wheel governed magnetically and connected to a rotatable shaft may step itself over the contacts to the one selected by a given number of impulses. A star wheel for each arc row is provided. Patent assigned to the Western Electric Company.

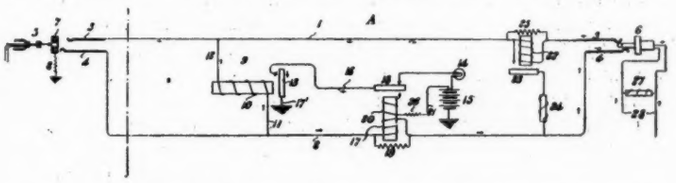
848,568. Telephone Detector. Piehn. In this system means are provided for detecting an intrusion on the part of the subscriber when his line has not been called and to



also find out the number of said subscriber. Patent unassigned.

848,636. Fire and Police Signaling System. Condon. The boxes arranged at outline points in the system are provided with doors which, upon being opened, operate the signaling transmitting mechanism. The key used for unlocking the door operates in conjunction with certain mechanism and determines the speed of movement of the make and break signal transmitting device. Patent assigned, one-half to Albert Barrett of Kansas City, Mo.

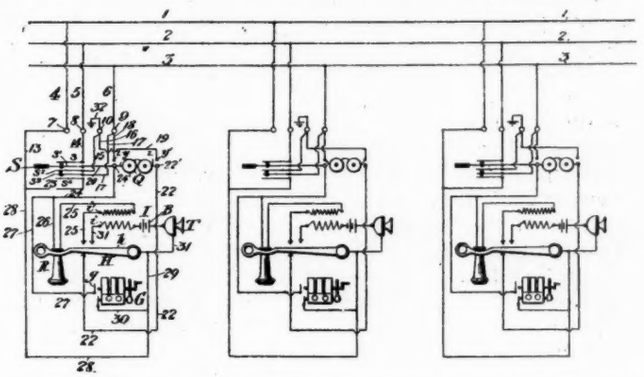
848,749. Trunk Circuit for Telephone Systems. Kelley and Heaford. This system employs a trunk circuit provided



with a toll board signal, relay controlled, the relay being bridged across the trunk circuit and actuated by current received from the main battery. After once being operated a lockout circuit is closed so the signals cannot again be actuated until restored to normal by the removal of the operator's plug. Patent unassigned.

848,814. Telephone Trunking System. Dean. The trunk signal of this system operates only on the actuation of the pair of relays, one being worked by current, from the outgoing end of the trunk and the other being initially actuated over a local circuit. A locking circuit maintains the last mentioned relay actuated and keeps the trunk signal operative until the subscriber responds. Patent assigned to the Kellogg Switchboard & Supply Company.

849,032. Telephone System. Wardner. Three line wires are used in this system and all are connected to the



terminals of each sub-station. A subscriber may either ring grounded or full metallic, thereby increasing the number of bells on a given line and preventing interference. A switch is provided for this purpose which locks itself on the receiver hook and is released upon the depression of the receiver hook. Patent unassigned.

849,250. Combined Telephone Desk Stand and Call Bell. L'Hommedieu. The base of this desk stand has a bell secured to it which surrounds the standard. The magnet for operating the bell is arranged in the base and has its clapper projecting therethrough in position to engage the bell. Patent assigned one-third to William A. L'Hommedieu of New York City and one-third to Harry L'Hommediu of Buffalo, N. Y.

849,336. Signaling Systems for Telephone Exchanges. McBerry. The line of this system terminates at the central office in a ground branch from one conductor which includes the line relay for controlling the visual signal. A branch leads to earth from the other conductor and the sub-station telephone switch unites said line conductors when closed and completes the circuit for the line relay. A connecting switch at central unites the link conductors of the operator's cord circuit with the line and applies current thereto from an associated battery which effects the energization of a relay controlling the withdrawal of the visual signal. Patent assigned to the Western Electric Company.

849,353. Electric Ear Telephone. Clarke. This is a telephone for deaf people, the battery thereof being carried in the pocket and having contact terminals which engage

the sockets of the transmitter terminals. The receiver is connected by a flexible cord to the sockets of the transmitter and both may be disengaged at will. Patent assigned to the Globe Ear Telephone Company of Boston, Mass.

849,375. Telephone System. Dean. This system comprises a line circuit having a cut off relay, a line relay or other signaling device and a source of current associated therewith, the arrangement being such that the taking up of the subscriber's telephone operates the line (not relay) but does not operate the cut-off relay, the latter being operated to render the line relay inoperative until a conversational circuit is established by the operator. Patent assigned to the Kellogg Switchboard & Supply Company.

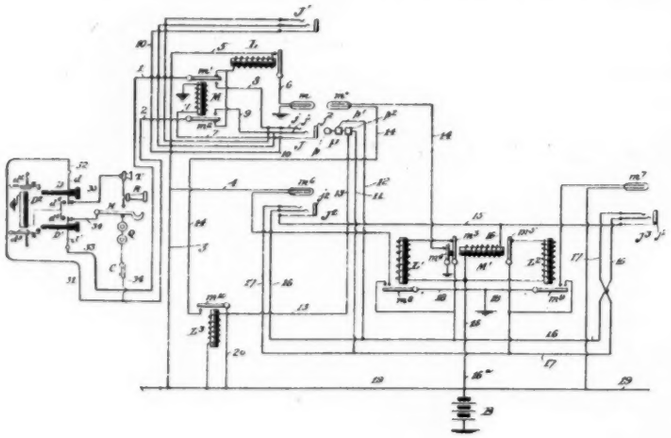
849,464. Telephone Trunking System. Dean. The cord circuit of this system is provided with a connecting plug and a connection from ground through a retardation coil to one contact of the plug whereby a path for current is provided which allows steady current to pass and to actuate the supervisory signal relay during connection, but which obstructs voice currents. Patent assigned to the Kellogg Switchboard & Supply Company.

849,615. Telephone Switch Box. Houghton. In this switch box there are arranged a plurality of contacts one set operated by the switchhook and the other set operated by a plug flexibly connected to the combined transmitter and receiver. Patent unassigned.

849,850. Telephone System. Muller. When the subscriber presses a button for a particular station he throws ringing current upon the line and both his and the called subscriber's bell rings and rings continuously until the receiver at the desired station is removed. At this time ringing current is taken off the line and talking current put on. Patent unassigned.

850,079. Telephone Repeater System. Warth. This invention consists essentially in the association of two repeater instrumentalities forming a double or twin repeater apparatus and with auxiliary apparatus and local circuits connecting them for operation in combination with the line circuits whereby the initial currents are received and relayed unindirectionally. This maintains a constant balance and prevents howling. Patent unassigned.

850,344. Telephone Exchange System. Clement. This is a divided multiple system of the same general type as those generally installed at St. Louis and Cleveland, but with this important difference, that a very large percentage



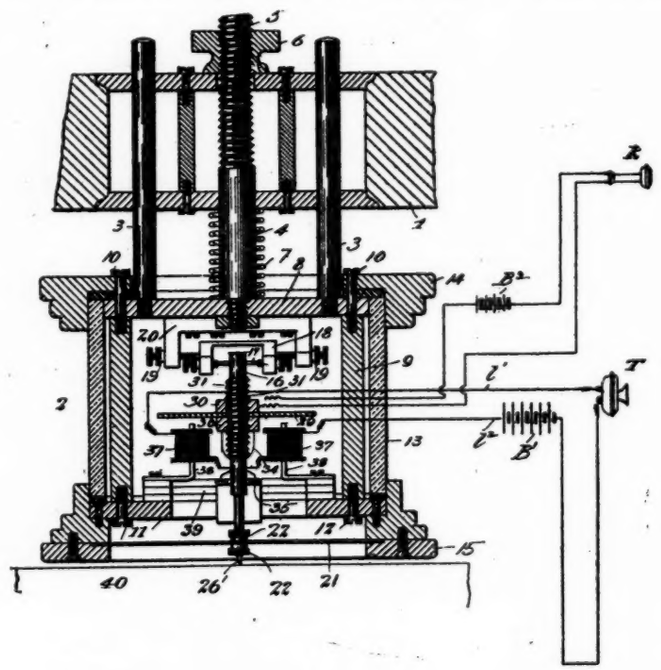
of the apparatus required in those installations is done away with. In this case each line has a single answering jack and line signal lamp, and the call is initially answered by an operator who plugs up a line to a trunk. These trunks extend to the different divisions of the board, or to the different exchanges in the system, and the selective act at the subscriber's stations, which is shown as pressing a particular button, results in setting some one of the trunk signals at the particular division or exchange wanted. In other words, the invention lies in putting the division signals into a small number of trunks instead of tying them onto all of the lines. Patent unassigned.

850,433. Telephone Apparatus. Kohn. In this system the sub-stations are provided with polarized and unpolarized magnets working together to control open receiver circuits at the calling station and to transmit current over the line to operate devices for preventing the closure of all other receiver circuits except the one called. Patent assigned one-half to Louis A. Ksensky.

850,434. Telephone Apparatus. Kohn. This system is very similar to the one just described to the same inventor, but when the subscriber sends a current to close his normally open receiver circuit, he also closes the circuit of a generator at the sub-station which operates a relay at central to close a circuit which operates devices at the other sub-stations and prevents the closure of their receiver circuits. Patent assigned one-half to Louis Ksensky.

850,470. Telephone Trunking System. Dean. In this system the trunk line which extends between different switchboards has multiple switch sockets at one end for establishing connection therewith and a call signal at that end is placed under control of the operator at the opposite end of the trunk. The sockets are normally disconnected from the trunk but adapted to be connected therewith when the talking circuit is established with one of said sockets. Patent assigned to the Kellogg Switchboard & Supply Company.

850,484. Reinforcing Telephones. Newman. In this invention there is employed a vibratory member which is set



in motion by the telephonic currents through a suitable magnet and which has its vibrations strengthened in one direction and otherwise assisted and controlled by a wax cylinder and stylus similar to those used on phonographs. Additional energy is supplied to the circuit by local batteries in the secondary or relay circuit. Patent unassigned.

850,558. Attachment for Telephones. Black. In this device a band surrounds the transmitter and has pivotally attached thereto a forked arm with an adjustable extension carrying a clamp to hold the receiver. This arm may be swung around in any direction and the clamp may be turned so that the receiver may be used by either the right or left ear. Patent unassigned.

SPECIFICATIONS FOR RUBBER COVERED INSULATED SIGNAL WIRES

As Adopted at a Recent Meeting of the Railway Signal Association

THE committee of the Railway Signal Association having in charge the compilation of specifications for rubber-covered signal wires, recommended at its recent meeting in Washington the adoption of the following rules for testing wires for signal purposes, carrying currents of 600 volts or less:

1. Conductors.—Conductors must be of soft-drawn annealed copper wire having a conductivity of not less than ninety-eight per cent of that of pure copper. Each wire forming a conductor must be continuous without splice throughout its length, must be uniform in cross section, free from flaws, scales and other imperfections and provided with a heavy uniform coating of tin.

2. Rubber Insulation.—The vulcanized rubber compound shall contain not less than thirty per cent nor more than thirty-three per cent by weight of fine dry Para rubber which has not previously been used in rubber compound. The gum itself shall not contain more than three and one-half per cent of resinous extract. The remaining seventy per cent of the compound shall consist of mineral matter only. The insulation must be tough, elastic, adhering strongly to the wire, must be homogeneous in character and placed concentrically about the conductor.

3. Taping and Braiding.—(a) The rubber insulation must be protected with a layer of cotton tape thoroughly filled with a rubber insulating compound, lapped one-half its width and so worked on as to insure a smooth surface.

(b) The outer braid must consist of one layer of closely woven cotton braiding one thirty-second of an inch thick, saturated with a black, insulating, weatherproof compound which shall be neither injuriously affected by nor have injurious effect upon the braid at a temperature of 200 degrees Fahrenheit.

4. Tests.—The manufacturer must provide at his factory all apparatus and other facilities needed for making the required physical and electrical tests and must provide the manufacturer's representative with all facilities for assuring himself that the thirty per cent of rubber as above specified is actually put into the compound. The inspector shall not be privileged to ascertain what mineral ingredients are used in making up the remaining seventy per cent of the compound. The manufacturer shall give free access to the place of manufacture and opportunity to test at all necessary times. Tests will also be made upon the finished product after delivery, and the wire will be rejected if it fails to meet the requirements of the specifications. The manufacturer must pay freight charges for return of all wire that may be rejected by the railroad company.

5. Physical Test of Copper Conductors.—Each solid conductor must stand elongation of twenty-five per cent of its length in ten inches before breaking. In torsion it must stand before breaking thirty twists in six inches. It must be capable of being wrapped six times about its diameter and unwound without showing signs of breakage after the process has been gone through twice. The tension and torsion tests will be made on separate pieces of wire.

6. Conductivity Test of Copper.—The conductivity of the copper shall be determined by measuring the resistance of a length of the wire and comparing with Matthiessen's standard of copper resistance.

7. Tests of Tinning.—Samples of the wire shall be thoroughly cleaned with alcohol and immersed in hydrochloric acid of sp. g. 1.088 for one minute. They shall then be rinsed in clear water and immersed in a sodium sulphide solution of sp. g. 1.142 for thirty-two seconds and again washed. This operation must be gone through with four times before the wire becomes clearly blackened.

8. Tests of Braiding.—Six-inch sample of wire with carefully paraffined ends shall be submerged in fresh water of a temperature of 70 degrees Fahrenheit for a period of twenty-four hours. The difference in weight of the sample before and after submersion must not be more than ten per cent of the weight of the sample before submersion less the weight of the copper and vulcanized rubber.

9. Physical Tests of Rubber Insulation.—A sample of the vulcanized rubber insulation not less than four inches in length shall have marks placed upon it two inches apart. The sample shall be stretched until the marks are six inches apart and then at once released. One minute after such release the marks shall not be over two and three-eighths inches apart. The sample shall then be stretched until the marks are nine inches apart before breaking and must have a tensile strength of not less than eight hundred pounds per square inch.

10. Chemical Tests of Rubber Insulation.—The vulcanized rubber compound shall contain not more than six per cent by weight of acetone extract and not more than seven-tenths of one per cent of free sulphur.

Size B. & S. gage.	Area in Circular Mils.	Thickness of Insulation.	Insulation resist. Megohms per mile.	Test voltage Alternating Current.
0	105,592	1/8" wall	1200	10,000
1	83,694	1/8 "	1300	10,000
2	66,373	1/8 "	1400	12,000
4	41,742	3/32 "	1300	9,000
6	26,250	3/32 "	1500	9,000
8	16,509	3/32 "	1700	9,000
9	13,090	5/64 "	1700	7,000
10	10,380	5/64 "	1800	7,000
12	6,530	5/64 "	2000	7,000
14	4,107	5/64 "	2100	7,000
16	2,583	1/16 "	1900	4,000
18	1,624	1/16 "	2000	4,000

DANGERS OF THE TELEPHONE.

The announcement is made in a dispatch from Washington that the principal telephone system at the national capital is seriously crippled, owing to an epidemic of mumps, which has affected practically all the operators at the central exchange. The cause of the epidemic is not given, and the question naturally arises whether the patrons of the exchange have been exposed to the disease. It has been claimed by many believers in the occult that there is a closer connection between subscribers on telephone lines than appears in the scientific literature of the telephonic industry. It is known, or at least strongly suspected, that this telepathic influence, if such it be, has caused the graduation of many telephone operators from the switchboard to the blissful or otherwise state of matrimony. It is also held by many authorities that mumps may be acquired by suggestion; hence the apprehension that the troublesome disease may be communicated by wire.

It is stated that when important officials of the Pennsylvania railroad go to Pittsburg by private car a telephone in the car is connected up immediately on arrival with the railroad exchange and the local exchange.

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EDITORIAL DEPARTMENT

THE CHICAGO TELEPHONE REPORT.

IN NO city of the United States has the telephone question attracted more public attention than in Chicago. For that reason, if no other, the report of the special commission of experts on the Chicago situation, made to the city council, deserves a careful study, and to enable its readers to give such TELEPHONY has decided to print the document in full. None of the newspapers, nor other journals, has essayed this formidable task, for the length of the report was sufficient to render a verbatim reproduction no ordinary feat. The importance of this exhaustive review of telephone conditions, however, induces TELEPHONY to make a special effort to enable its readers to study the entire proposition. With that end in view this issue contains the first half of the report, including the introduction, Part No. 1. dealing with the feasibility of the proposed project of the Manufacturers' Telephone Company, and Part No. 2, relating to the relative advantages and disadvantages of flat rates and measured rates for telephone service.

In the June issue of TELEPHONY will be printed the second half of the report, embracing Part No. 3, dealing with the application of the Chicago (Bell) Telephone Company for an extension of its franchise; Part No. 4 covering the desirability and practicability of universal toll connections with the city of Chicago, and the conclusions of the commission. The charts and tables will be found helpful in studying the result of the inquiry made by the experts.

This report was made by D. C. Jackson, William H. Crumb and George W. Wilder to the council committee on gas, oil and electric light, to which was assigned the important duty of passing on the ordinances which seek telephone franchises for the Bell company, now in possession of the field, and the Manufacturers' company. With regard to service, rates and the regulation of rates the commission report is most comprehensive, and no doubt will be of great interest to everybody engaged in the telephone business. The report contains 124 pages in its printed form, and there has been a demand for copies which has far exceeded the supply. Subscribers to TELEPHONY in possession of the May and June numbers will have the complete report, which will be a valuable addition to any library covering telephone subjects.

BELL REBUFFED AT ROCHESTER.

THE Bell interests which have been striving to absorb the United States Independent Telephone Company of Rochester, N. Y., have met with a setback which promises to defeat their plans about which the Bell has been gleefully chuckling for weeks past. Attorney-General Jackson of the state of New York filed a suit to prevent the merger, and now the Bell leaders have withdrawn their proposition. This effectually checks the scheme of the American Telephone & Telegraph Company to sieze the United States Independent, and is hailed as a signal victory for the Independent forces.

It was a hard fight, for the Bell had claimed a victory early in the proceedings, and was loath to admit itself defeated. No stone was left unturned to put the deal through, as the Bell hoped thereby to deal the Independents a hard blow. Political aid even was invoked to help the octopus, but the Independents made such a united fight that the Bell was forced to withdraw.

GENERAL BUSINESS OUTLOOK.

WE HEAR a great deal these days about the likelihood of a business depression. The country is prosperous, the nation is at peace with all the world, and, in short, "times are good." Yet croakers are abroad who say "Watch out for a panic." We scan the horizon and only those of us who are inclined to be pessimistic can see any storm clouds. Everybody seems to be busily employed, failures are few, the manufacturers have orders on hand to keep their plants running for months to come, and, in brief, his majesty the American citizen appears to be as flush with

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the coin of the realm to-day as he ever was during the 131 years of his existence. And still, from time to time, certain bilious financiers shake their heads and wisely say "Watch out for a panic."

The very prosperity of the country has tightened the money market recently. There is so much business that many manufacturers have been tempted to go ahead on insufficient capital. More money is required now for the purchase of raw material than has been the case in years, which, of course, makes it necessary to have more capital to produce the same amount of goods.

The wise financiers are not shouting "Wolf!" nor do they anticipate any serious trouble, but they are advising that, as the machinery of industry cannot safely be run without a safety valve, a little slackening in the rate of speed may prove a wise precaution at this time.

There is every reason to expect years of business success if no serious obstacles are placed in the way of those who are developing the resources and industries of the country. The presidential election next year may make the business world trim its sails somewhat, but, after all, there isn't a cloud the size of a man's hand in sight to warrant any grave fear of a business stagnation of material importance.

A KELLOGG TWIN.

IT IS apparent that the idea that it is poor policy for Independent telephone operators to buy apparatus from concerns having Bell affiliations is taking a deep root throughout the field. That is an encouraging sign, for when one fully realizes who are his enemies he is very likely to stick to his friends, and not make a mistake by confusing the two dissimilar characters.

A prominent telephone man, in a letter to TELEPHONY, says:

"In the April issue of TELEPHONY I notice under the heading, "The Kellogg Again" an inquiry from a man in Missouri wanting to know the relationship between the Kellogg Switchboard & Supply Company and the Bell people. I notice the good work that you are continuing to do along these lines, but it appears to me that while our friends—or rather our enemies—the Kellogg people are "getting theirs" it would be well to hand out corresponding information relative to the Western Electric Company, which, without any attempt at concealment, as to its Bell affiliations, is working hard for the Independent trade. I know in this particular territory they are making an aggressive campaign for the business of the Independents, and they are not only getting a portion of the supply business but are also selling telephone equipment direct to some Independents.

You will bear me out when I say that the Western Electric Company in a way is a greater menace to the Independent movement than the Kellogg company, for the reason the Western Electric Company in many cases goes to the Independent telephone companies and makes them a proposal to connect with the Bell company, using the Bell talking circuits on their instruments and also making them a confidential proposal to the effect that they need not use and pay for any more Bell talking circuits than they care to and that the Bell company would arrange for the Western Electric Company to supply whatever the operator might need in the way of apparatus and supplies, giving them an advantage over the man who is in no way affiliated with the Bell company. There is no question as to this, nor is there any question as to the strong effort of the Western Electric Company is making among the Independents to place its apparatus and supplies.

Now, if it is a mistake for the Independents to buy from the Kellogg company because the profit is diverted to the Bell company, why is it not just as grave a mistake for them to buy from the Western Electric when there is no question whatever as to the ultimate disposition of profits received

Our correspondent takes the right view of the situation. Independent telephone operators should beware of buying apparatus and supplies from the Western Electric Company, because it is a Bell concern. TELEPHONY has pointed this out before, and reiterates the belief now that it is the height of folly for Independents to patronize a Bell company and furnish the monopoly with means to fight the Independent movement wherever there is competition between the two forces. The only difference between the Kellogg and the Western Electric is that the latter is confessedly Bell, whereas in some sections of the country apparently the Kellogg still pretends to be a friendly ally of the Independents—as the inquiry from Missouri answered last month plainly indicates.

No matter what name it may bear, it behooves Independent telephone operators to steer clear of any manufacturing concern which has affiliations with the Bell. There are so many Independent manufacturers making a superior line of equipment that it is folly to purchase from Bell controlled factories.

TELEPHONY'S 1907 DIRECTORY.

TELEPHONY announces the publication in the early part of May of its 1907 "Directory of the Telephone Industry." This work is one of the natural developments of TELEPHONY'S widely known mailing list, being the latter adapted to the buyer's standpoint, instead of to the seller's, and being also embellished with such additional features as a very complete and reliable classified list of the manufacturers and dealers of the telephone field, a list of its contractors, engineers, patent attorneys and experts, and a list of the principal toll line companies, together with a list of all the state and national telephone associations and their official rosters.

This volume, containing some 200 pages, will also give detailed information concerning the leading Independent operating companies, as well as present a list of all the Bell companies and their operating exchanges.

In brief, it is TELEPHONY'S purpose to make this work all that it purports to be—a complete directory of the telephone industry; a book, in fact, which will reflect creditably the magnitude and importance of this great and growing field. In addition to making this book one of high merit from the standpoint of its contents, it will be distributed to more than 10,000 of the best buyers in the telephone trade, embracing the purchasing agents of every operating company upon TELEPHONY'S manufacturers' mailing list.

Advertisers, whose attention has been called to this proposition, unhesitatingly pronounce it the best and cheapest, one-time advertising opportunity which the telephone field has yet produced, and the indications are that the forthcoming volume will fully reflect the prosperity of the industry in a most comprehensive manner.

TELEPHONY invites suggestions as to how to make this directory of the greatest value to its recipients, the managers and purchasing agents, for whom it is especially designed.

INDEPENDENT SECURITIES UNSHAKEN.

IN THE recent Wall street flurry, when the most stable railroad and industrial stocks were bobbing up and down in hysterical fashion, Independent telephone securities were affected comparatively little. The gyrations of the speculative ring caused the most substantial industrials to fluctuate more or less—some of them a great deal—but the Independent stocks held their own. This fact should be extremely comforting to men in the Independent ranks.

One of them, E. L. Barber, has the following comment on this development:

"It is a matter of gratification to the men who are back of the Independent telephone proposition to note that during the recent slump in stocks Independent stocks did not suffer nearly as much as other securities. Not in a single place have I been able to discover a considerable shrinkage in the price of telephone stocks, and they have more than held their own. The Independent telephone business is as yet only in its infancy and the securities must, of necessity, grow in value as the business develops throughout the country. Each new subscriber to an Independent telephone, no matter where it is, makes that much stronger the securities all over the country."

It should be a source of deep satisfaction to investors in

Independent telephone securities to know that the capers of the Wall street bulls and bears do not make their holdings wobble. It has come to be a common saying that the antics of the New York stock gamblers do not affect the real prosperity of the country at large, but the fact remains that what occurs in Wall street influences most stocks throughout the United States. No better testimonial of the staunchness of Independent securities could be offered than the failure of Wall street stock flurries to affect, disadvantageously, their standing.

VALUE OF CONVENTIONS.

INDEPENDENT telephone men derive a vast amount of good from attending district, state and national conventions, and it is wise for them to be present at all such gatherings. In union there is strength, and inevitably men go home from such meetings encouraged and fit to do better and more earnest and successful work in their respective fields. It is impossible for men engaged in the same industry to meet, exchange ideas and compare notes without each going away better fortified for the work in hand.

At telephone conventions valuable discussions add to the general knowledge, and the members separate feeling better equipped and more interested in their particular branches of the business. The fraternal spirit is developed, and a sentiment of co-operation is inspired that makes the work of the succeeding year easier. The papers read on various topics help those who study to prepare them, and the practical ideas advanced furnish food for thought to those addressed. Most of them are based on actual experience, and prove materially helpful to those not so well acquainted with the subject handled. Their influence is wide, and accomplishes more genuine good often than the writers themselves realize

The Independent telephone conventions have been a source of real strength to the movement. In this connection it is well to remind the field that the 1907 annual convention of the International Independent Telephone Association will be held in Chicago June 4, 5 and 6. Let there be a full attendance, for matters of vital importance will be up for settlement.

THE BELL AS A TAX DODGER.

THE charge is made in the rural districts of Illinois that the Bell subsidiary companies are evading payment of their rightful taxes in a manner calculated to stir the wrath of the ordinary farmer. That it is stirring his wrath is demonstrated by the indignant comments in the country press. Of course, it is traditional that the average property owner is expected to fight to the last gasp to hold his taxes down as low as possible, but for all that the unblushing course of the Bell in a number of Illinois counties in the matter of assessments has staggered even the most easy-going critics.

As an example, in Bureau county the Bell company last year paid in taxes a total of $1.67, and this year it will pay $2.07, a tremendous gain of fifty cents. The Bell has thirty-eight miles of telephone lines in Bureau county, and boasts that it is the most expensive construction in that section. The Bell has asserted that one equipped pole costs $2 and that there are thirty-five poles to the mile. Inasmuch as the Bell people have thousands of dollars' worth of wire, cables, exchange equipment—to say nothing of franchise rights—the honest farmers of Bureau county think that $2.07 is ridiculously low taxes for the big monopoly to pay. The amount of the assessment was fixed by the state board of equalization, which has a name for being easy on corporations, and not by the local assessors. In some townships in Bureau county where the Bell has between $500 and $1,000 worth of property the obliging board of equalization scheduled the assessed value at $1. No wonder the other taxpayers complain, and the Independent telephone men declare the Bell octopus needs to be checked.

In the same connection it is interesting to note that in Minnesota the state public examiner has discovered that the report of the Northwestern (Bell) Telephone Company for taxing purposes is "shy" over $45,000 in the gross earnings, and that the state is entitled to $1,400 more from the Bell licensee than it was willing to admit. Apparently the octopus has no restraining prejudices that keeps it from dodging taxes in one state as well as in another.

INDEPENDENT GROWTH IN CANADA.

THE Independent telephone movement in Canada is making great strides, and especially in the development of rural lines. The farmers of the Dominion are clamoring for the telephone as never before, and the experience of those who have the benefit of a line is so favorable that their neighbors are demanding the same advantage.

Independent telephone companies operating in York and Ontario counties are meeting with a generous response from the agricultural element. This year they propose to construct many miles of new lines. They hope to enter East Toronto with a service and to extend their lines from Pickering towards Audley and Kinsale. Oshawa Town has sent them an invitation to enter that place and operate a local plant.

The Toronto World in pointing out the possibilities of the Independent movement in Canada urges the necessity of Independent companies making their rates so low as to attract the people generally. In urging "a moderate and living charge," that paper says:

"We have become so accustomed to the extortionate rates of the Bell monopoly that this is an end much to be desired. These extensions of the Independent lines will add a wider usefulness to this system and will be the beginning of much activity among our rural friends. The farm home can be made so much more desirable by the introduction of the telephone that every farmer ought to have one installed for the social benefits alone. But it is essentially a financial question to the farmers, and he who grasps its advantages is the one who will make the quickest money. As is to be expected, the Bell company is performing some peculiar somersault policies at the various points of competition. For instance, it is offering telephones near Pickering for $3 a year. The Bell offers other prices elsewhere. Its charges from Green River and from Brougham to Toronto bear no correspondence of rates. The embargo upon commerce, public enjoyment and farm comforts, placed by the extortionate charges of the Bell company, is enough to compel all these tempting baits to be refused with disdain. The Independent company will do well to push the good work and the farmers should see to it that they protect their own interests by crushing the Bell monopoly."

A "moderate and living" rate is what Independent company's competing with the Bell should establish, but at the same time they should exercise care to see that the rate is not so unwisely "moderate" as to be outside the "living" definition. In other words, Independents should not adopt rates at the outset that will be ruinously low, and thus encounter serious trouble later on. The emphasis should be laid on "living" as much as on "moderate" in the adjustment of telephone rates.

A SMOOTH BELL SCHEME.

THE following Associated Press dispatch sent out from South Bend, Indiana, under date of April 20, is being heralded in some quarters as being an Independent victory over the Central Union (Bell) Telephone Company in Indiana. The dispatch states:

If the proposition submitted to the Independent telephone people of northern Indiana by the Bell company at the meeting held here

to-day is accepted, it will mean practical elimination of all opposition in the state and abandonment of the field to the newcomers. The plan of the Bell is to merge toll business, giving twenty-five per cent of each originating message, but not to exceed five cents for any paid minute. On all messages over the lines of the American Telephone and Telegraph Company fifteen per cent is to be allowed on each originating toll, but not to exceed ten cents on any one message.

The agreement offered refers to the cities included as follows:

First district—Connections for toll business will be made with the Independent exchanges at Atwood, Bremen, Bristol, Dunlap, Knox (through Winona exchange), Ford, paying in addition to commission a standard rate for use of lines; Nappanee, Pierceton, Plymouth (ceasing to perform any switching at this point), Rochester, Talma, Wakarusa, Warsaw (establishing a toll switch station here and cutting out all local service), Burgan, Etna Green, Leesburg, Claypool, Silver Lake, Palestine, Milford and other points as may be decided upon.

The plant at Elkhart, Goshen, Michigan City and South Bend will be sold to the home telephone companies now operating at those points, or leased at figures based upon their present value, the Bell first removing all such property as can be used elsewhere without loss; or it will merge the properties in those cities with the home companies at figures based upon the relative values of the two plants. The Central Union will then connect its toll lines with these exchanges, thus affording the use of all its long-distance lines.

The second and third districts cover the central part of the state and include Fort Wayne.

The effect of an arrangement of this kind, as can be seen, would be to exempt the long-distance company from threatened opposition, while the Bell company would in all probability be willing to unburden itself of the heavy loads caused by opposition at lower prices than it claims it can furnish satisfactory service.

While this all sounds very well and shows that the Bell in Indiana has acknowledged defeat, it would be a poor move for Independent companies to enter into any agreement of this kind. The Bell has ridiculed the idea of competition for many years, and has made a hard fight against what it calls the "opposition." It would not recognize Independents when the anti-Bell forces were weak and scattered. Now, however, when the "opposition" has captured the entire country, the very wise Bell managers come out with a statement that they will withdraw from the local field, if they are given the toll and long-distance business. The Independents in Indiana are strong in the number of their exchanges, stockholders, subscribers, and toll lines, and can gain nothing through Bell affiliations. The proposition of the Bell should be declined for the reason nothing can be gained to the Independents, and much may be lost.

BELL FINANCIERING UNDER FIRE.

STRENUOUS objection is being made by stockholders in the Bell corporation to the financial policy of the monopoly's directorate, but this fact is not receiving much attention from the Bell publicity bureau. At the annual meeting of the stockholders of the American Telephone & Telegraph Company, held recently in New York, J. S. Fay, Jr., who is the fifth largest stockholder in the corporation, entered a vigorous protest against the method of the directors in disposing of its latest bond issue. Attorney Sturgis, representing Mr. Fay, declared that ever since 1881 his client has been a stockholder of the company, that he had never sold any of the stock and had always backed the actions of the management until the issue of the convertible bonds. He stated that in the report of March 27, 1906, it was said that the directors had sold $100,000,000 convertible bonds of the $150,000,000 authorized on terms favorable to the company; and that this amount would be sufficient to supply funds to the company until 1908, and would include the retirement of $20,000,000 notes due May 1, 1907.

The representative of Mr. Fay went on to say that according to the last report dated January, 1907, the company sold $25,000,000 three-year 5 per cent notes at a reasonable price to pay off their floating debt. The directors sold this $25,000,000 notes to the same bankers, viz., J. P. Morgan & Co., at a reduced price, and reduced the option price of the remaining $50,000,000 convertible bonds to a figure far below that at which they were offered to the public. Mr. Fay believed that this was unfavorable to the best interests of the company, and showed poor financial judgment.

In justification of the directorate's action, President Fish stated that the development and extension work of the corporation had progressed more rapidly than had been anticipated and that this had made it necessary to adopt the course pursued. He declared the directors had acted to conserve the interests of the stockholders as seemed best in the judgment of the management of the company. Whereupon the objectors were expected to retire and hold their peace. It is a characteristic of the Bell monopoly that whereas its press bureau has taken infinite pains to spread broadcast the report made at the annual meeting where this stockholder's protest was filed, there has been a significant silence with regard to that emphatic complaint, made, it should be remembered, by the fifth largest stockholder in the corporation. Family jars like this are not welcomed by the Bell managers, who—if they had their way—would relegate them to the "Forget it" department. Should there be such a discordant note in any Independent meetings, however, how the Bell would crow and emphasize the incident as positive proof that there were revolt and discord in Independent ranks! It all depends, of course, where the family quarrel occurs.

"THE STORY OF THE STATES."

TELEPHONY has deemed it advisable to suspend the series on "The Story of the States" until after the International convention. This issue contains the first installment of the report of the Chicago Telephone Commission, which, in many respects, is the most important document of its kind ever prepared relating to the telephone question in cities. With this vital treatise occupying so much space—and the important subject could not be adequately handled in less—and the usual wealth of other material, TELEPHONY found it impossible to include "The Story of Iowa," which was to appear in the May number, and keep within even ordinary bounds. June, too, will be a crowded month on account of the convention report, and as we have no intention of slighting the story of Independent telephony in Iowa, it was considered wise to postpone the publication of that feature of the series until the rush is over.

For this reason, the announcement is made that "The Story of the States" will be suspended until the July number. Iowa will be covered in that issue, and Wisconsin in the succeeding month. As a fertile field for Independent growth Iowa has proved to be a wonder, and readers may expect an interesting narrative of the movement in the Hawkeye state. The hiatus of two months should only whet the appetite for the Iowa number of the series.

The Rocky Mountain Bell Company is growing decidedly unpopular among telephone users in Montana. Citizens of Great Falls held a mass meeting recently and adopted resolutions condemning the Bell for inefficient service, unfair wages for the operators, and the exorbitant rates for the use of telephones. A committee was appointed to confer with the company and bring about a settlement, and if this failed it was the sense of the meeting that all telephones be ordered out within twenty-four hours. If the company fails to act the patrons are to take them out themselves.

The *Telephone Securities Weekly*, which aims to cover the financial field of the telephone world, made its first appearance April 13. Paul Latzke, author of "A Fight with an Octopus," is the editor. The new publication is issued from New York and devotes its energies to distributing news relating particularly to stocks, bonds and other telephone securities.

NEW TYPES OF APPARATUS

Suggestions That Prospective Buyers Should Keep in Mind When Considering Untried Devices

By R. A. Wilson

A NEW TYPE in the telephone trade, so far as this article is concerned, is a device intended to embody in mechanical form an idea or principle which will perform the regular telephonic function and at the same time prove more advantageous than the regular apparatus of the day. To do this it must be either more economical in cost, require less expensive line construction, be more durable, operate more rapidly, be less complicated in construction, or be more attractive in appearance. If it accomplish any one of these purposes it is, of course, worthy of consideration, but the conservative buyer will wish to have the fact demonstrated beyond a reasonable doubt before paying out his good money for it. Further, he will also want to be sure that even though it have the advantage claimed, it does not also necessarily carry with it some disadvantages which will more than offset the claims of the salesman. As the telephone art is so new and the march of invention has been so rapid, we have grown accustomed to witnessing the displacement of older forms of apparatus by these new types, and the trade in general recognizes that the most familiar types are only accepted conditionally until something better may be invented to take their places.

On the other hand, the whole history of the trade is strewn with wrecks of new types that went wrong. How many readers of this magazine have escaped? It would be interesting to know how many have purchased equipment supposed to be a step in advance of the state of the art, but which proved to be so full of trouble or so disadvantageous in other respects that the purchaser was glad to discard it and return to that which time had tried and proved useful. Along this line I think the experience of the average telephone man will show that even though the progress of the art has been almost miraculously swift, nevertheless for every distinct step forward there have been many stumbles which brought disaster to both the purchaser and the manufacturer.

It is not in accord with human nature that such should be the case, for time is already the source, the means and the final arbiter of human judgment. Time alone thus tells us that something better is demanded; time alone enables the inventor to develop an idea of something better, and time alone proves whether or not that idea accomplishes its purpose. So long, therefore, as only the need and the idea have been developed, it is utterly impossible to forecast, with certainty, the result. Furthermore, since human judgment is limited wholly to the past, it is not in accord with its nature that the future should be opened to it. Inferences, of course, may be drawn, and, fortunately for human progress, many of these inferences have proved to be correct; but, nevertheless, since they are based wholly upon the past, any new combination which they suggest is more likely to be wrong than right. For there are many ways to go wrong but only one way to go right.

For these reasons it is, in my opinion, desirable that a few general principles be established if possible by which new types may be judged. By such principles, if they can be established, the buyer will be protected in a degree and will avoid the unpleasant dilemma of either rejecting all new things or falling a victim to every new claim of enthusiastic salesmen. Thus he will be able to investigate new types on their merits and to choose those which are necessary to keep step with the march of progress. On the other hand he will unhesitatingly dismiss from consideration those types which do not conform to the established principles, and in this manner will be saved from unfortunate purchases which affect unfavorably his bank account and his patronage.

For these reasons let us consider the many claims which are made for new types and then also consider how far the conclusions reached should carry. To do this I think the list of claims given above will substantially cover the subject, and the first of these is that a new type is cheaper than the established type. Whether such is or is not the case is at once disclosed by the price asked. But if it be cheaper what are the reasons? These I think can be enumerated without difficulty. First, the new design may be constructed along new lines. If so, naturally these questions arise: How does it differ from the regular type? What new features have displaced the older forms? In what different ways are the necessary functions performed; and, last but more important than all the others, has time recorded its verdict? In other words, where has a sufficient number of the new type been in use under all conditions of service to demonstrate its superior efficiency and durability. It must be remembered that both the efficiency and durability are essential factors and that the latter takes much time to be demonstrated.

It would, therefore, be unwise to adopt a new type simply because it works. Testimony respecting its durability should therefore be demanded, and such testimony should come from so many sources and testify to such long continued use under such varying conditions of service and climate as to leave no doubt as to the truth of the testimony and the disinterested character of the witnesses.

When, therefore, a new piece of apparatus is offered which operates efficiently and to the durability of which a large number of widely scattered purchasers will testify, then the buyer is reasonably justified in purchasing for his own use. He will then be reasonably secure from making a mistake, whereas without these precautions his best judgment is only a guess made under the influence of an enthusiastic advocate. If the claim, however, be the second in the list, namely, that less expensive line construction is required—the same considerations should govern, for a saving in expense is the same in character whether it be in the instrument or the line. In this connection, however, it may be added that all testimony should be most carefully scrutinized to determine not only whether it is disinterested, but also whether it is based upon a trial for a sufficient length of time to be the result of experience rather than enthusiasm.

The third kind of claim is that the new apparatus while similar in form and performance of function, is simply more durable than that in use. This claim is hardly worth consideration, for in these days all time-tried types of apparatus of standard makes are so durable that the ordinary telephone or switchboard will outlive the state of the art in which its form expresses the highest perfection. Years ago this claim had weight, but I think the experience of purchasers will warrant them in agreeing that the regular apparatus (not novelties) of all standard makes which has been bought within the last four years is in practically as good condition as when first installed. Durability may therefore be accepted as a foregone conclusion, respecting regular apparatus pur-

chased from any one of the old-established factories whose size testifies to the extent of its business and the range of its experience. This applies, of course, to the regular types which such factories have had on the market for years. It would not and does not apply to new types of any kind or character. And the reason is obvious, for just to the degree that the new type varies from the time-tried regular type, it must await the verdict of time for approval or rejection.

The next claims are that the apparatus operates more rapidly and is less complicated in construction or less expensive to maintain. Here again must the verdict of time be consulted. Again must the testimony of users be sought and the purchaser must assure himself from a variety of witnesses that the claims are based on experience rather than enthusiasm. Of course, the experience of the purchaser will be used so that inferences may be based on it to justify or reject the claims. But the fact must never be lost sight of that all human judgment is based upon the past, and that no inference respecting the untried can be much more than a guess.

The last claim, that of being more attractive in appearance, requires no such testimony, because here is the accomplished fact, already historical when the purchaser has looked upon it. In such a case it is not a question of what its various complicated parts will do in the future, but simply how it looks, and in this type of claim each purchaser requires no testimony or other aid to assist him in forming a judgment. The old and the new are side by side and the sense of sight is all the aid required by the understanding to reach a decision.

If what has gone before is true, it will be seen that two things, and two things alone, are required to judge the merits of any new type of apparatus, aside from the question of appearance. First, a series of inferences based upon the experience of the purchaser or his technical expert with apparatus where the different features of the new type have been present but not combined. If these inferences are unfavorable, then further investigation is unnecessary. But however the opinion formed may be, it must always be remembered that at best it is little more than a guess, until confirmed by the experience of others who have used the particular novelty for a sufficient time, and under sufficiently varied circumstances to demonstrate every claim made for it. Such testimonials should not be taken at second hand from the salesmen. The purchaser should rather write to users of the new type in all parts of the country and on these replies together with his own opinion, a decision should be based. And now having developed principles to guide the investigation of new types of apparatus, let us consider how far favorable conclusions should carry.

In the first place it should be remembered that most of the leading factories carry a varied line. They make apparatus of all types and kinds that circumstances and conditions demand. Nearly all of these are standard and regular, have been tried by time and the verdict of users is available. If, therefore, a new type is considered and approved, it does not necessarily follow that the other types and kinds of apparatus made by that factory are also superior to the same types and kinds of apparatus produced by other factories. It has sometimes happened that when a factory has been fortunate enough to have developed by its engineering department a distinct advance in the art it has reaped an illogical harvest from that fact. Under such circumstances the sales department has argued that here is one type which is superior to existing similar types, therefore all types produced by this factory are superior to similar types produced by other factories. This assumption is, of course, illogical, as it does not follow that because a man is tall, he also has long hair. He may in fact be bald. Likewise, a factory which has produced a most useful invention in one branch of the art may or may not be abreast of the times in other branches of the art.

I have often noticed the contrary to be true. And the reason is illustrated in every branch of industry. This is an age of specialization, and genius which is capable of rising to great heights is usually narrow in its scope. If you want the best plow you can buy you do not go to a department store. Do you not, on the contrary, go to a dealer who makes a specialty of plows and whose experience in plows is therefore in itself a guarantee of quality? Likewise, with respect to telephone factories. If a factory specializes in some particular field of the art and products superior equipment in that field, it does not follow that it is equally superior in all branches. On the contrary, it may be that the effort to excel in one branch has been made at the expense of effort that might have been put forth in other branches. If a factory speciliazes, well and good. It may, and sometimes undoubtedly does, excel its competitors in that specialty. But that is no reason why it should command a premium on its other products which are not in the field of its specialty.

On the contrary, purchasers apply to all apparatus when presented for consideration the principles outlined above. If two or more types are wanted, each should receive the same scrutiny, whether they have the same or different nameplates. And it is always well to remember that every factory usually makes the most noise about that type of apparatus which is its specialty, and therefore in which it probably excels.

BLIND GIRLS FOR OPERATORS.

In the October (1906) issue TELEPHONY printed the portrait of Kirk S. Thompson, a blind telephone operator who manages the switchboard at the Erie (Ill.) exchange. The idea of employing blind persons as operators is being taken up in New York to a remarkable extent.

Miss Hanna Isaacs, the blind telephone operator of Lebanon hospital, the Bronx, has undertaken to teach a class of blind girls the art of manipulating a telephone switchboard. She is doing this at the suggestion of an officer of the telephone company, who agreed to hire the blind operators if they show anything like Miss Isaacs' proficiency.

Miss Isaacs was taken to the hospital some time ago to have an operation performed on her eyes. At that time her sight was failing. Before the operation could be performed, however, she suffered from blood poisoning, and it was necessary to take out both of her eyes.

The unfortunate young woman had neither relatives nor friends. She had become a general favorite at the hospital, and Superintendent William Daub planned to keep her and make some easy berth for her. At that time the hospital did not have a telephone switchboard, and as one was going to be put in one of the surgeons suggested that the blind girl learn to operate it. The switchboard was put in and it now has ten trunk wires and forty extensions.

The girl learned to operate it in two days with such skill and splendid precision that everyone who watched her work was amazed. Like Mr. Thompson she also learned to operate a typewriter, and now handles all the correspondence for Superintendent Daub.

Recently the young woman was invited to attend one of Helen Keller's lectures at the Waldorf, and after Miss Keller spoke she told of her experience as a telephone operator. Before this Superintendent Tucker of the telephone company had taken a deep interest in the girl, and proposed that she teach a class of blind girls to become telephone operators. She was delighted with the idea, and has undertaken the work with enthusiasm, as she believes the telephone work will furnish lucrative employment for many sightless women.

QUESTIONS AND ANSWERS

By H. P. Clausen

ONE of the questions which should be discussed in these columns pertains to the individual experiences of our readers in the matter of connecting the negative terminals of storage batteries to the earth where a common battery system is used for supplying current to the line circuit, both for signaling and talking purposes. It is perfectly safe to start out with the assumption that there is only one correct way for grounding storage batteries when used for telephone service; for the positive side of the battery should be grounded and under no circumstances should the negative side be grounded instead. The experience obtained after years of observation absolutely proves that when the negative side of the storage battery is grounded it is certain to result in a gradual deterioration of all circuit portions of the exchange equipment which connect to the positive side of the battery. In other words, the air is never perfectly dry, and whenever any dampness exists in the atmosphere a layer of moisture is present between the different terminals of the relays, impedance coils, line wires, etc., and when this film of moisture is present there is a constant tendency for the current to flow from the positive side of the circuit to the negative, and if this negative terminal is connected to earth, it is obvious that an electrolytic action must be constantly present. That is to say, we are using circuit material as the annode and depositing metal from the circuit material onto the negative side of the battery, which, in this case, is the earth. We cannot deny that this action does take place, for current always flows from positive to negative. If the positive side of the storage battery is grounded, it is obvious that we are plating from the positive side of the storage battery—or earth side—onto the negative side of the circuit, and owing to the fact that the wires which are connected to positive side of the battery are at the same potential as the earth, it is easily understood that but very little tendency exists for a plating action from the positive side of the circuit wires to the negative side, and as far as the writer has been able to determine, no electrolytic troubles have been observed to take place from the positive side of a telephone circuit to the negative side while the positive side of the circuit is grounded and the apparatus is mounted upon the frame work which also is grounded.

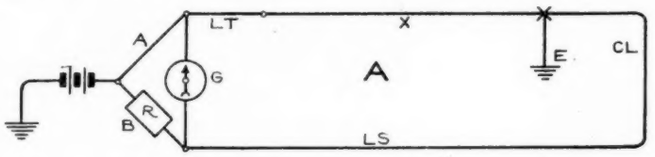
This brings up another question, and one which can be discussed with considerable profit. Whenever the positive side of a storage battery is properly grounded what is the result when the framework upon which the relays, etc., are mounted is not connected to ground? It is thought that with an ungrounded relay frame, electrolytic troubles are sure to occur in the course of years and that on general principles all relay frames should be grounded, even if it is done only for the purpose of preventing an accidental negative cross to remain on the frame for a sufficient length of time to introduce electrolytic troubles.

Another question which can be touched upon relates to the grounding of the switchboard iron frame work.

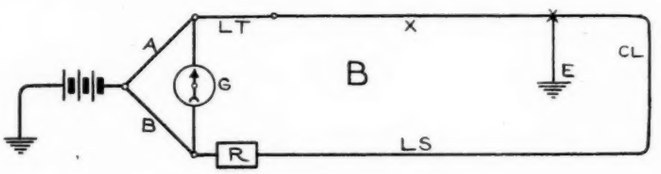
The writer shall endeavor to follow up these matters from time to time and trusts to hear from TELEPHONY'S readers, especially those who have gone through a siege of open relay windings, open bridle wires, etc., which troubles finally were found to be due either to the negative side of the storage battery being connected to earth, the relay frame not having been grounded, or owing to neither side of the storage battery being grounded. It is only by obtaining a record of these experiences that we can hope to bring out the different points and help to educate each other.

I have been a reader of TELEPHONY for a number of years, and am much interested in "Questions and Answers" and beg to ask a favor of you. I wish to know how to make a Murray loop test in a bad cable with a Wheatstone bridge. I can make the Varley test all right, but do not know how to set the bridge arms. The bridge arms read one, ten, one hundred, in A, and ten, one hundred, one thousand, in B.—S. A., Arkansas.

Owing to your failure to state the type of Wheatstone bridge that you have available it will be impossible to give you an exact diagram of the connections which are required, but as you appear to understand the execution of the



Varley and Murray loop tests, it need only be stated that with the Murray loop shown by Diagram A, the Diagram B shows the Varley loop test circuit. You will notice that



the chief difference between the two methods lies in the fact that with the Wheatstone bridge used in the Varley tests, the bridge arms *A* and *B* are used as ratios, and that the rheostat arm *R* connects in series with the circuit being tested, which means that the galvanometer connects across the bridge arms and that the rheostat is connected to the outside.

The diagram clearly shows the connection, and as the different calculations for making these tests have appeared a number of times in TELEPHONY, they are not repeated here.

Could you recommend any work on the telephone which deals any way extensively with composite telegraph and telephone systems? If so, would you kindly let me know price posted direct? I am a constant reader of TELEPHONY and have been since the beginning of 1903. I would ask whether you can recommend any work on the telephone which deals extensively with composite telegraph and telephone systems? If so, would you kindly let me know the price? I am in the employ of the commonwealth government and in charge of telephones and switchboards in the western district of New South Wales. This district has an area of over 36,000 square miles and contains towns at which small exchanges have been established. There are twenty-two switchboards and connected to them are 2,000-odd telephones. Several of the telephones are connected together by means of the composite telegraph and telephone system, or, as we call it here, the condenser system. I wish to study things up a bit and try to improve the existing service.—M. B., N. S. W., Australia.

A series of articles dealing with the problem of telephony and telegraphy will shortly appear in TELEPHONY. This series of articles undoubtedly will give you the information that you want. There are no books published in the English language which exclusively treat the subject of com-

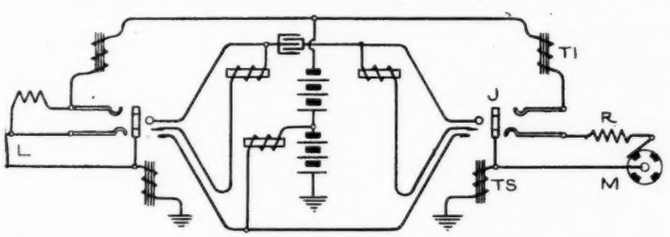
bined telegraph and telephone work. There is a French book entitled "Simultaneous Telephone and Telegraph," published in Bruxelles, 1885, by Ed. Buels of the French Telegraph Administration. This book contains numerous diagrams, and the subject is covered in 226 pages, but it may be added that most of the data found in this book is pretty generally known, although if you are able to read French it may be an excellent book for you to obtain.

If you will direct a letter to the French Telegraph Administration, they will undoubtedly be able to supply you with a copy of the book. We suggest that you watch the columns of TELEPHONY and you will obtain more information on this most interesting subject.

Will you please give me in your next issue of TELEPHONY a diagram of a good howler circuit to be used on an American Electric Telephone Company's common battery switchboard? I have tried using forty volts on a buzzer through the primary of an induction coil with the secondary on the tip and sleeve of the plug and so on to the line, but it does not seem to serve the purpose. Can you suggest something better?—S. S., Texas.

The system which you are operating is of a type in which the line current supply is fed through impedance coils connected to each side of the line as shown by the diagram below. The cord circuit is of the two-conductor type in which a supervisory relay connects across the first and second tips of the plug. The sleeve side of the cord circuit being supplied with battery whenever the plug is inserted into a line jack.

In order to install a howler circuit in connection with this system, a plan shown by the diagram is submitted as one which will probably meet with your approval. *TI* and



TS are the regular impedance coils used on a line circuit. *J* may be one of the line jack. *M*, however, is a make and break wheel attachment which may be operated at any required speed. *R* is a limiting resistance to prevent your obtaining too severe a signal. You will further observe that another jack, *J*, is so arranged that only during the period that you have a plug in the jack does the battery current flow through the make and break arrangement. This resulting in a material saving of current, and at the same time eliminating the possibility of inductive noises due to the howler current effecting the normally quiescent condition of your line.

Will you kindly tell me through the columns of your paper why the "kick coil" magneto call telephone is not more popular? Is this scheme not a practical one, and, if so, why is it not taken up by all telephone manufacturing companies? Is it not a success on local lines? If not, why not? Do you think the transformer cuts down the talking efficiency, or is the signaling not perfect?—B. A. P., North Dakota.

All "kick coil" telephones are based on the principle that the battery which is in the telephone is utilized for the purpose of signaling the central. This is the first objection to this kind of telephone. The batteries which are at the telephone are subject to a considerable drain whenever the transformer is operated, and owing to this drain of battery current, it is obvious that the telephone must be equipped with new batteries in perhaps one-third the time that it would otherwise call for renewals. The time stated is merely an opinion and not based on actual experience, although some of our readers may be able to give information on this point. The fact remains, however, that it is impossible to conceive that a "kick coil" telephone battery will last as long and give as good service from a talking standpoint as a telephone not equipped with an arrangement for consuming battery current other than that called for by the transmitter.

This question of renewing batteries is further emphasized by remembering that the only way you can signal the central office is by the use of the "kick coil" arrangement, and if the batteries at the telephone are weak either through a long continued use of the telephone while talking or through a run-down battery, what means have we for reaching the central office? Absolutely none other than renewing the battery or going to some other station or awaiting for a chance to "get at the operator," which could only occur when the station is called from the exchange. Another objection to this kind of instrument is that the hook switch contacts must be very carefully adjusted and kept adjusted to a proper point, for it is only while the hook switch passes from one position to the other that the battery is connected to the primary of the transformer, for a short period, and if this period is not long enough the signaling is not satisfactory.

As to the advantage of the "kick coil" telephone, there is no question that it is a great convenience to be able to remove a receiver from the hook switch and obtain connection with central, and it is a great saving in time at the central office when the replacing of the receiver to the hook switch automatically clears out the connection. The talking service of the telephone is not affected materially by the secondary of the transformer constituting the "kick coil."

Your question as to why all manufacturing companies do not make the "kick coil" telephone, can best be answered by suggesting that when the telephone purchaser demands an instrument of a certain kind the manufacturing company generally stands ready to supply it, but owing to the probable limited demand, the manufacturing companies are not extensively advertising this type of an instrument.

A STORY FROM BUTTE.

The conjunction of a wild cat, telephone wires and a heavy electrical storm played havoc near Butte, Montana, recently. A telephone message from Big Hole River brought word to headquarters that a pole supporting a line near that village was on fire and endangered that section of the system. The foreman of construction, with several helpers, started for the scene of trouble to investigate the cause and fifteen miles from Butte came across a pole nearly consumed by fire. After extinguishing the flames the linemen looked around for the cause and discovered on the ground at the foot of the pole the badly torn fragments of what once had been a half-grown wild cat or young mountain lion. Tangled in the wires were its tail and shreds of flesh, giving a good clue how the beast had met its fate. Either through curiosity or fright the big cat had climbed the pole, and while on the cross-bar had created a short circuit or received a severe shock during the storm of lightning. The bolt had put the animal out of commission and ignited the pole. The linemen brought several claws back to Butte as souvenirs of the unique accident.

TELEPHONE INCREASE.

Should the ratio of increased use of the telephone keep up the wires will soon be carrying more messages every day than are handled in the mails. In the last three years the number of subscribers has doubled over the total of the previous twenty-four years, and because of the extended use of the telephone the average cost of every class of messages has been reduced to 2.2 cents, but little more than that required by the average mail.

IRONTON (OHIO) AUTOMATIC EXCHANGE

Description of Equipment Installed by the Home Telephone Company

By Rudolph C. Butler

WHAT is generally regarded as a fine example of a modern automatic telephone exchange has been installed at Ironton, Ohio, for the Home Telephone Company of that city. This up-to-date plant has been equipped by the American Automatic Telephone Company of Rochester, N. Y., and begins operations with flattering prospects of success. This company was incorporated in January, 1906, under the laws of the state of New York, to manufacture and sell automatic telephone switchboards, with the right to engage in the general manufacture of telephone apparatus, if desired. Suitable preliminary factory quarters were at once selected, and the necessary machinery and dies acquired. The company preferred to begin operations with a new automatic system, based upon entirely new principles in the automatic art. The system has been developed and perfected by careful and severe tests of parts, painstaking experiments, and practical applications. The first application was in the Ellis Hospital, Schenectady, N. Y., which was soon followed by a system in the Eastman Kodak Works, Rochester, N. Y. The latest application is the exchange of the Home Telephone Company, at Ironton, Ohio, which is equipped for four hundred direct lines and one hundred four-party lines, making in all eight hundred telephones.

The switchboard frame, of which there are two sections, is shown in Figure 1 without the encasing cabinet. Figure 2 shows the switchboard frame with its encasing cabinet. The latter is made of highly polished golden oak, with glass. There is an entrance door at one end of the enclosing cabinet, and the sides are provided with sliding doors, so that the switches and wiring are readily accessible, and are at the same time thoroughly protected against dust. In addition

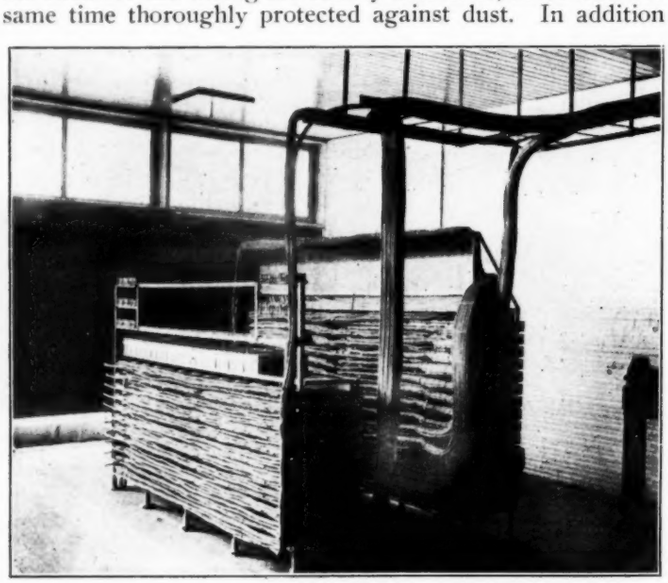


Figure 1—Switchboard Frame, Without Encasing Cabinet.

to the dust protection afforded by the cabinet, it should be noted that the construction of the switches and their arrangement in the frame is such that they are self-protected from dust. All contact springs are horizontal, and no contact is exposed to dust settling by gravity. Figure 3 shows the relay rack, with a polished golden oak glass encasing frame and the wire chief's desk, while Figure 4 shows the power equipment.

The company claims that it is the first to have adopted a central energy system of automatic exchanges, and in doing so it has developed the same along manual lines in methods of operation as closely as possible, wherever it was desirable, thus making the scheme readily understandable by manual men, and less difficult to educate attendants. The advantages of secret, uniform, quicker, more reliable and cheaper service are claimed. It is the only automatic sys-

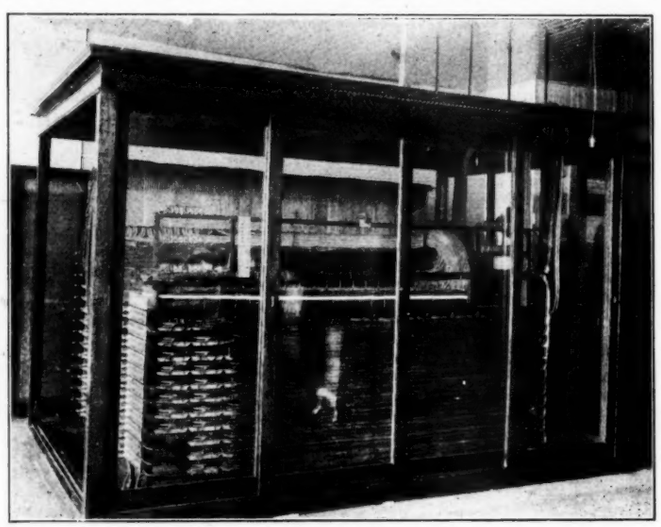


Figure 2—Switchboard Frame, With Encasing Cabinet.

tem using two wires, and making no use of the ground for selective purposes, therefore, it is said, there can be no failures from change of earth potential, as is the case in other systems where earth is used. The two wire system has also made it possible to develop an exceedingly simple sub-station selecter, there being only one electrical contact, and that with a commutator arrangement similar to a dynamo, except, of course, that there is but one segment on the commutator. It has thus been possible to eliminate all fine adjustments, and greatly reduce the cost of sub-station maintenance, to say nothing of the increased reliability.

At Ironton the system is provided with Dean harmonic party lines, but any system of selective ringing can be used, and party lines may be equipped with look-out attachments of simple design, if desired, making secret service possible on party lines as well as on direct lines. Automatic pay stations may be provided, if desired, in which coins are automatically taken, or returned, depending only on whether the called party has, or has not, answered. If the called party does not answer, the coin is returned to the calling party. The instrument will also discriminate between rates automatically, and measure the time for both original and fractional periods, compelling the payment of proper amounts if conversation exceeds a pre-determined period. Under certain circumstances coins will be returned after service has been rendered, for example, where a party is called who has advertised to pay for all incoming calls, or where a subscriber desires to use a pay station to report trouble to the management, in which case the coin is always

returned. If more coins are deposited than are required by time of conversation, the remainder of such coins is returned to the calling party when the receiver is hung up. All coins collected at pay stations are automatically recorded on a meter in the central office, affording a check on collections.

Metered service may be provided, where it is desired to operate a service on a metered basis, arranged to register in the central office every call that has been answered. This is done mechanically and electrically, and is not dependent upon an attendant. Meters can be arranged to register all calls, either out-going, incoming, or both. Furthermore, the registers may be arranged so that they will not record calls which should not be recorded, such as, for example, a call to the company's management to report a defect in service. They can also be arranged to record at different rates, depending upon the rate determined for the place in which the called party is located; or they may be arranged to record on the basis of elapsed time in the use of telephones.

Figures 5 and 6 represent respectively the switch base and

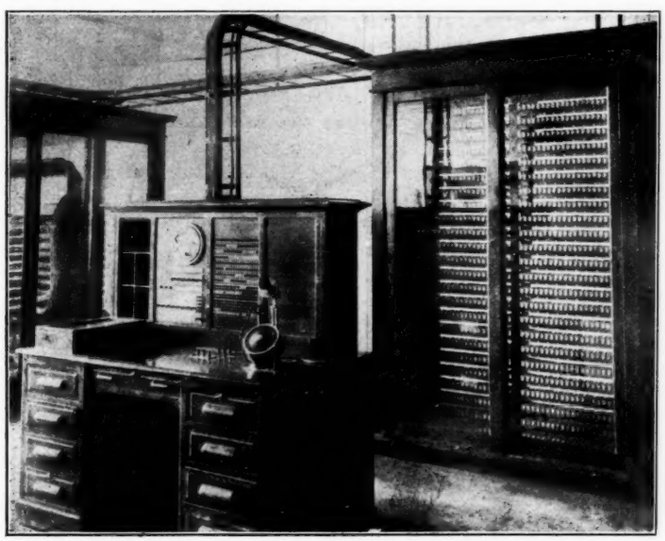


Figure 3—Relay Rack and Wire Chief's Desk.

bank base, with operating mechanism, consisting of the motor magnet shown at the right of switch base; release magnet is shown at the left; and a ratchet wheel carrying brushes for making connection with the bank contacts. The motor magnet has a spring steel driving pawl attached to the upper extremity of its armature, which engages with the teeth of the ratchet wheel and serves as the means of moving the wheel forward one step each time the motor magnet is energized. It is possible to drive this wheel forward over its entire course in one-half second, and to stop it with precision while moving at that rate with its brushes resting upon anyone of the bank contacts desired. Just back of the driving pawl there is another spring steel pawl, which also engages with the teeth of the ratchet wheel. This pawl serves, when the switch is in operation, to retain the ratchet wheel in any position to which it may have been advanced by the driving pawl.

To the armature of the release magnet there is attached a steel release spring, the upper end of which normally rests against the left hand end of the driving pawl. This spring is provided with a notch just below the point at which it rests against the driving pawl, the arrangement being such that when the release magnet is energized the release spring is moved forward until the notch passes over the end of the driving pawl, thus when the release magnet is de-energized, the release spring draws both the driving pawl and the retaining pawl from engagement with the teeth of the ratchet wheel, allowing the latter to return by its spring tension to its zero position. The first following movement of the motor magnet displaces the release spring, and permits the driving and retaining pawls to again engage the teeth of the driving wheel. It will be noticed that there are no cords to become entangled. Current is fed to the brushes by the feeder springs attached to the right-hand end of the bridge which supports the shaft of the ratchet wheel. The ends of these feeder springs press upon segments at the lower end of the brushes.

The switches are equipped with male jacks, as shown at the top, and the banks with female jacks, located to coincide with each other. All switches of a certain class are interchangeable. It is therefore possible to remove and replace one by another in a second or two. The service is in no way disturbed while the change is being made. This feature is important because it admits of the adjustment of switches at a convenient testing table, after which they can be placed in the frame with assurance that they are in proper working order. Another useful feature of the arrangement of the bank and switch bases is the positive alignment when the switch is inserted in the bank base. The male portion of the switch is provided with a tongue which is A-shaped at its edges, and the female portion of the bank base is provided with V-shaped grooves into which the A-shaped tongue is inserted, making an absolute alignment between the switch and the bank, both horizontally and vertically.

The bank base is of the four-point type, two rows of contacts being for line connections, and two rows for exchange control purposes. This is the largest bank in use in any exchange. A large per cent of the banks have only three rows and some only one row of contents. In practice the brushes of the switch never pass off of the bank contacts. The normal position of these brushes when the switch is at rest is on the first contact of the bank. It is thus possible to adjust the brushes with a firm spring tension against the bank contacts, thereby assuring a more perfect contact than would be possible were the brushes normally out of engagement with the bank contacts, as has heretofore been the practice. For this reason no calls can be missed by a failure of the brushes to properly enter upon the contacts. The switch has but one movement, namely, horizontal.

Tests have been made in which switches have operated over the entire bank of contacts 500,000 times without inter-

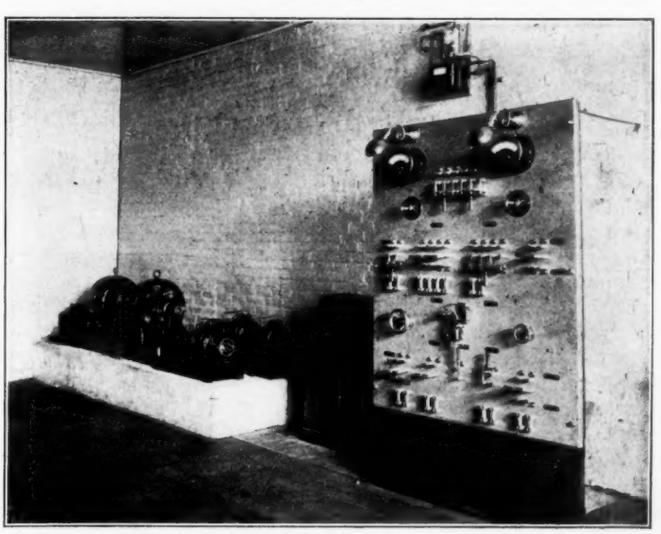


Figure 4—Power Equipment.

mission or failure, and running day and night for that purpose. As fifty steps are necessary to pass the brushes over the entire bank of contacts, it follows that the pawls engaged the teeth of the ratchet wheel 25,000,000 times in this test. At the end of the test the pawls and the ratchet wheel were found to be in good working condition, showing

scarcely any wear, in fact, the teeth and the pawls were not much more than polished. As these are the only wearing parts in the switches, and as the test greatly exceeded the possible requirements of many years of actual service, a further test was considered needless, and it was therefore discontinued.

Figure 7 is a standard central energy wall telephone equipped with sub-station selector. The only change necessary to convert it into an automatic was to open the line circuit on the rear of backboard, extend the two ends through the backboard, and connect them to the commutator contact of the sub-station selector. This can be done with any style of central energy wall telephone; moreover, if it is desired to change an existing manual plant to automatic, it can be done without removing the telephone from the premises, and without interruption to the service, except for the brief interval occupied in attaching the sub-station selector, and after the sub-station selector has been attached, the telephone may continue to be used manually until the automatic control office equipment is installed, at which time it will only be necessary to transfer the lines in the central office from the manual board to the automatic board to complete the automatic service. As the sub-station selector is the only piece of equipment located outside

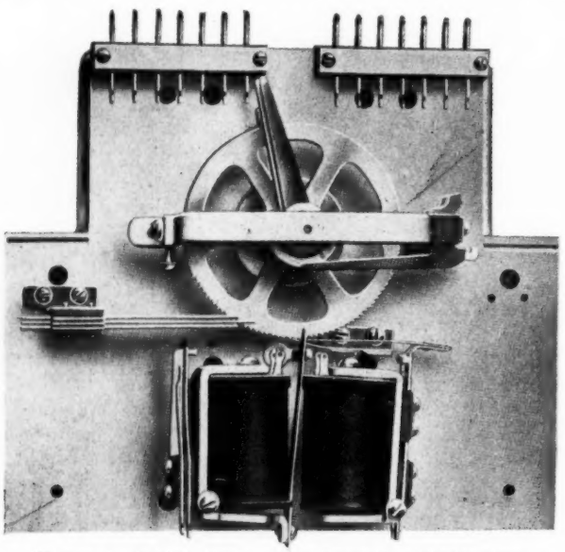


Figure 5—Switch Base, with Operating Mechanism.

of the central office, it has been made exceedingly simple, durable and reliable, to avoid frequent inspection, adjustment and repairs. The additional maintenance on sub-station apparatus is thereby reduced to a minimum. It will be in fact but a trifle over that of a manual telephone, and this will be more than counterbalanced by the reduced cost of maintenance upon the central office equipment.

Each sub-station slot may be supplied with a lamp, if desired, receiving its current from the central office over the telephone wires, lighting the dial as soon as the subscriber removes the receiver from the hook. The light will be sufficient to find the number for making calls, or the numbers in the directory, without first illuminating the room. To call with this sub-station selector the receiver of the calling party is first removed from the hook. The pin is then inserted in the hole on the dial of the sub-station selector corresponding to the first number of the combination desired, and by means thereof the dial is revolved to the right as far as it will go, after which it is allowed to rotate back by its own spring tension to its normal position. The operation is repeated for the second, and all following combinations desired. In rotating backward the mechanism of the sub-station selector opens and closes a single commutator contact a number of times corresponding to the number of the hole in which the pin had been inserted, thus transmitting its impulses to the switches. With two movements of the dial it is possible to select any of 2,500 subscribers, and with three movements this number may be increased to 125,000 selections. Hanging the receiver on its hook opens the circuit, releases the switches

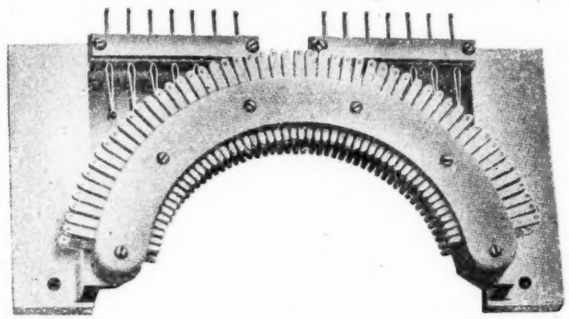


Figure 6—Bank Base, with Operating Mechanism.

and restores them instantly to normal. The release being instantaneous it follows that the calling subscriber is immediately able to make another call.

It will be noted that the system of numbering is different from any other system, either the present manual or automatic, and is known as the hyphenated number system, either single or double numbers being transmitted at one time as desired, and as hereafter described. When a busy telephone is called, an audible busy test is transmitted to the subscriber. In large exchanges it is practicable to use a phonograph, or telegraphone, to announce the fact when a busy line is called. As there are fewer switches than there are telephones, the lines being represented by a line and cut-off relay, exactly the same as in manual practice, instead of a switch, it follows that successive calls rarely pass through the same set of switches, hence should a subscriber in making a call happen to select a switch which has for some reason failed it is only necessary for such subscriber to restore his receiver to its hook, remove it again, and repeat the call. In the latter case an entirely new set of switches and circuits will be assigned. The wire chief, however, will have received notice through lamp supervision located on his desk of such defective switch, which can, as

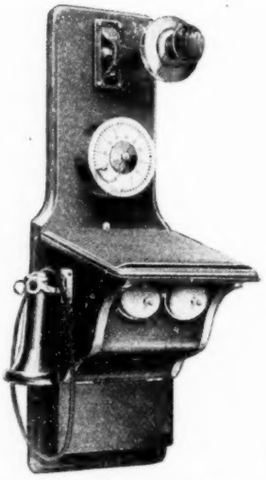


Figure 7—Wall Telephone Equipped with Sub-Station Selector.

Figure 8—New Automatic Desk Telephone.

above stated, be replaced with a perfect switch in a second or two.

The system herein described is one in which two motions of the dial are used to complete a call. The switches necessary to an exchange based on two motions of the dial are distributer B., C., D., X., and G switches. When a sub-

scriber removes the receiver from the hook, the talking circuit is closed through the springs of the sub-station selector, or calling device. This operation energizes the line relay, which removes the ground battery from the contact representing the calling subscriber on a row of semi-circular bank contacts. Above this "busy" row of contacts and swept by wipers mounted on the same shaft, are the corresponding rows of "line" and "mate" contacts. Thus on the banks of a B switch there are three rows of 50 contacts representing the "line," "mate" and "busy" of fifty subscribers' lines. On the instant that the line relay acts, a distributer switch is started by the forward contact on the line relay springs. This distributer switch in its rotation throws ground on a bank point representing the starter wire of a B switch in the group from which the call is to be made, starting it to sweep its arc of bank contacts. As soon as the wipers have traveled to the point from which the ground has been removed on the "busy" row of contacts, the calling subscriber's line has been found and, having found the caller, it stops, returning ground battery to the point from which the line relay had removed it. In stopping the B switch also throws ground on a corresponding point in a fourth row of contacts on the banks of the B switch. This last-mentioned ground contact operates the cut-off relay.

On the same instant that the B switch leaves its normal position in its search for the calling line, the X switch starts to rotate in search of an idle C switch. The B and X switches being in series, then, the subscriber is now connected direct to the line jacks on the C switch, which may call into any one of fifty groups, each group representing fifty subscribers. The above operations are all accomplished in from one to one and one-half seconds.

The group to be reached is designated by the first number called on the dial at the calling subscriber's station. The calling device, or sub-station selector, as we have named it, has only two springs. These, with the receiver hook springs of the common battery variety, are the only springs in the subscriber's station. The springs in the sub-station selector are normally closed, and are so arranged that the contact is opened and the circuit interrupted when the dial is operated. These interruptions always correspond to the number pulled on the dial, which may be from 1 to 50. Thus, if 35 be pulled on the dial, the impulses occasioned by opening the circuit thirty-five times would be taken up by the mechanism and magnets of the C switch, causing it to rotate to the 35th point on the bank contact arc. This 35th point, then, represents a trunk to the 35th group of fifty subscribers. All the trunks to this group are terminated on the banks of the D switches for this group, and these D switches find the calling trunk in practically the same manner as the B switch found the subscriber's line. Then comes the simple operation of calling 21 on the dial and we are connected with the sub-station 35-21 through the G switch, which is the last to rotate. This G switch is equipped with a greater number of relays, and has a more complex circuit for purposes of ringing the called subscribers' bells, detecting busy lines, etc. When a subscriber is through talking he hangs up his receiver, which makes his line test open. This permits certain relays on the switches to make back contacts, which operate to release the call, and restore the switches to normal.

On party lines in this system the group of fifty subscribers is in reality four groups, on the banks of which are represented fifty line circuits. A certain number (any that is desired) of G switches is supplied with 16-cycle harmonic ringing current, then for each of 33, 50 and 66-cycle ringing current the same number of G switches are installed. To the banks of all these G switches all the 50-line circuits are multiplied straight through, so that the initial number of the call to any one of these party line subscribers merely indicates which ringing current is desired on any one of these fifty lines.

Figure 8 shows the new automatic central energy desk telephone.

MODERN TOLL SWITCHBOARD EQUIPMENT

The Third of a Series of Articles Dealing with this Important Subject

By J. E. Hilbish, J. B. Thiess and G. A. Joy

ARTICLE III.

MULTIPLE Toll Boards.—When the number of subscribers in a non-multiple switchboard becomes so large that three or four operators are unable to properly handle the same, common practice is to discard the non-multiple board and replace it with a multiple switchboard. This transformation is also applicable to toll equipments; and since in our previous articles we have completed the discussion of the non-multiple toll board we are now in a position to study the larger multiple toll equipment. In a multiple toll board we have, as the name implies, all the toll lines entering the exchange in front of each operator—i. e., the lines are multiplied in each section in a manner identical with that used in a local multiple switchboard. Thus the necessity of transferring calls is obviated, since every toll operator is able to call any toll subscriber directly by means of the multiple without the aid of any other operator. Consequently any local toll connections can be handled by any toll operator since all the toll lines in the exchange can be readily reached in the multiple, whereas in a non-multiple board the call would have to be given to the operator in whose particular position this line terminated. Thus the local to toll business can be uniformly distributed among the operators in a multiple board, whereas in a non-multiple board this would not be possible. Hence occasions would arise when one operator would be severely taxed while another operator at the same moment might be idle. The above reasons must make it self-evident that by means of a multiple toll board it is possible to operate much faster, and therefore more efficiently. These items become factors worthy of consideration when the toll business has assumed large proportions. Furthermore, a multiple toll equipment makes the use of a recording operator imperative. This operator does all the clerical work for local to toll connections—i. e., makes out all the toll tickets for outgoing calls, from which it will be evident—due to the economic principle of division of labor—that this work will be accomplished with greater speed, uniformity and accuracy, and consequently a large percentage of the clerical errors so fatal to toll business will be avoided.

The multiple toll systems may be divided into three distinctly separate varieties. These are: First, those using drop signals exclusively; second, the ones employing lamp signals only, and, third, a combination of the two. Local conditions regulate, to a great extent, the kind of equipment best suited to any particular exchange. Thus in a

drop board the equipment in the face of the board, for a certain number of lines, requires more space than the apparatus necessary for the same number in a lamp board, and consequently for a like number of lines the equipment in the drop board would have to be crowded. There are several reasons why the drop board is less expensive than the lamp board, the principal one being that in a drop board all the equipment, line as well as cord, can readily be placed in the back of the board, thus avoiding the installation of a relay rack in the terminal room and the cable necessary in wiring from this rack to the board. However, it is often considered an advantage to have all of the line equipment on a separate rack, where if the same be neatly numbered it is readily found and easily reached by the repairman in clearing trouble. In a lamp board equipment it is customary to distribute the equipment in this manner, it being understood, of course, that in a lamp equipment a line relay is used in place of the drop used in the drop equipped boards previously described. This relay has two windings, one of which is connected directly across the line and is actuated by the subscriber when he operates his generator; while the second is merely a locking winding, holding the armature in place after it has been drawn up by the alternating impulses of the calling party's generator. These lines and the cut-off relays are mounted on the rack in a manner similar to that used for the same named relays in a local subscriber's exchange. One of the objections that might be raised to the lamp board is that, since a line relay is used, the circuit is not as positive as the drop system—i. e., there is a chance for trouble in the local circuit from the relay to the board, such as a burnt-out lamp, or a poor relay contact, and therefore a subscriber might ring in all right and lock up the armature of the line relay, but the operator would receive no signal, whereas if a drop board were used with the same conditions prevailing the operator would surely get the signal. What has just been said makes it obvious that the circuits for a lamp board are more complex than those used in a drop board, and for this reason, where skilled attendance is not available, the drop board is preferable. One of the very desirable features of a lamp board is that the line jack and signal can be mounted directly above one another, which condition is not advisable in a drop board as explained in article No. 2.

A few words in regard to the cabling of toll lines in the exchange seems advisable at this point. We would recommend that all toll lines be cabled from the high current arresters to intermediate distributing frame and after cross-connecting should be carried directly to the answering jacks instead of a rack placed at the rear of the board. In case the rack is used, two extra soldered connections are introduced into the line circuit, and this not only enhances the possibilities for trouble but also increases the cost of the board due to the extra forming of cables and soldering of joints. It might be well right here to call attention to the fact that all sharp bends in the cable should be avoided since it is generally acknowledged by men familiar with the operation of toll boards that these are the weak spots of the installation, for in nine cases out of ten, when a high potential current finds its way into the board, the ensuing trouble will be located in burn-outs at these turns. A sharp curve may make a neater job, but this is an instance where looks must be sacrificed to insure stability and freedom from trouble.

Before going into a detailed description of either system, a few remarks concerning the manner of obtaining the busy test on multiple toll boards seem essential. There are two standard methods of obtaining this test: First, the regular well-known audible test, and, second, a visual test, employing a signal associated with each multiple and answering jack, the same being energized when the line is busy. The audible test is applicable to either system, while the visual test is not desirable for a drop board in our estimation, but may be used with great success for a lamp board. The reason that we condemn the use of visual busy signals in connection with a drop board is that a short interval of time elapses during which a line may be busy, and the signal does not indicate this condition. The reason for this is that the busy signal is energized by the operating of the cut-off relay, and therefore is no indication that the line is busy from the time the drop falls until the toll line operator answers. While this is but a few seconds at the most, it is long enough for another operator at the board to plug into the multiple jack of said line and ring. In a lamp board the conditions are different, for the local circuit through the busy signal is closed through a contact on the line relay, and when the cut-off relay is energized, releasing the line relay, it also closes the battery circuit through the signals so that they indicate a "busy line" from the time the party rings until the operator takes down the connection. These conditions will be described in detail after each system has been discussed, and the existing conditions can more readily be comprehended.

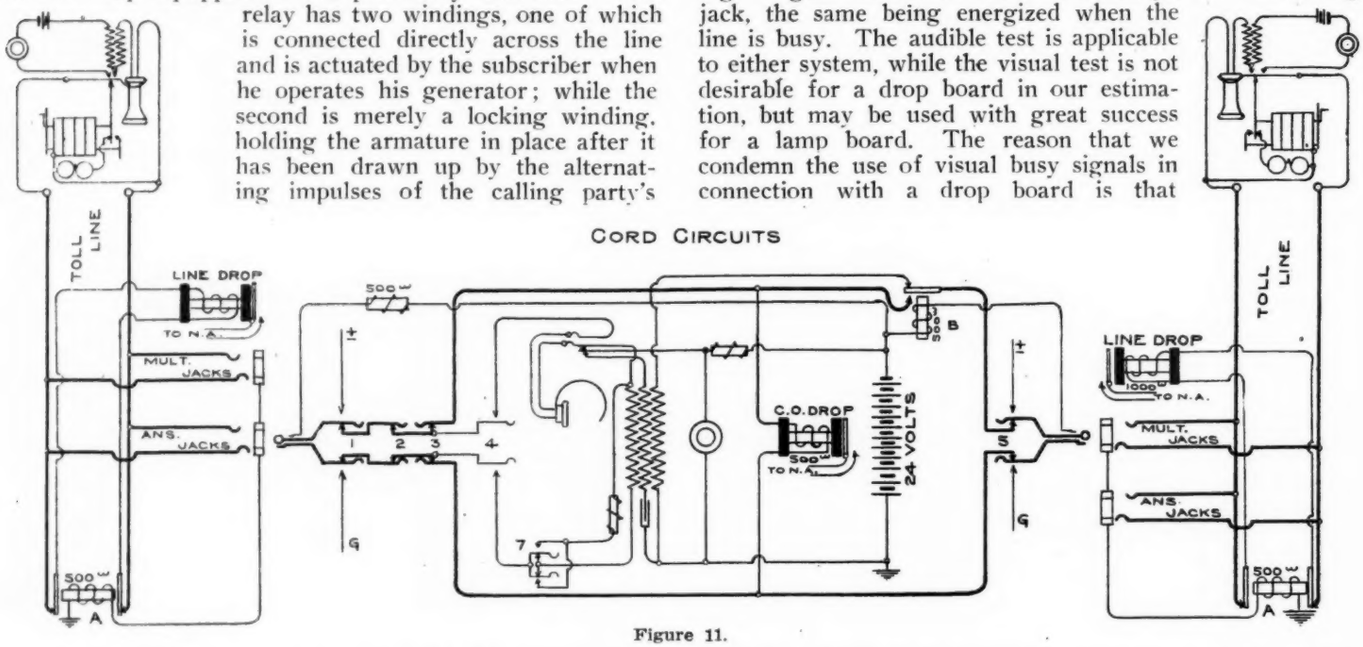


Figure 11.

Since the drop board is the simplest form of multiple toll system, we will begin our detailed analysis of this class of equipment, showing and describing all the circuits and apparatus for this type of board. The best means of obtaining a clear conception of an equipment of this kind is to study each class of service separately—i. e., to study the cord circuits of the simpler connections such as the toll to toll and toll to local first, as a means of becoming familiar with the general operation of the multiple toll equipment,

even though this type of circuit equipment is not to be recommended, since, as previously stated, a universal cord is the most desirable.

Toll to Toll Connections.—Consequently we will adopt this method in the following and will begin our description with the toll to toll connection, the circuit of which is shown in Figure 11. By referring to this drawing it will be observed that the toll line drop is bridged across the line by means of the break contacts of relay *A*, the function of said relay being identical with that of the cut-off relay in a local line circuit, namely, that of disassociating the auxiliary line signaling apparatus from the line. Thus the chances of impairing conversation are reduced to a minimum. The cord circuit is a straight metallic connection, the tip conductor of which is normally broken to provide suitable means for obtaining the busy test.

The operation of the circuit is as follows: When a subscriber desires a connection he operates his generator, thereby energizing the winding of the 1,000-ohm drop bridged across the line which will cause the shutter of said drop to fall. The operator upon seeing this signal will plug into the answering jack of this particular line, and thus complete a circuit through the winding of relay *A*, which will operate the same, subsequently opening the break contacts of this relay. The act of plugging in will also raise the potential of the sleeve strand of the jack to that of the negative side of battery and hence should an operator test any multiple jack of this line she will obtain the busy signal. The operator will then bridge her telephone set across the line, by operating key No. 4 and ascertain the number of the party desired, and if the line called for is idle she will plug in and ring. Due to the insertion of the plug, the potential of the sleeve strand of the line will be raised as before, and at the same time a circuit will be established from the ground on relay *A* over the sleeve conductor through relay *B* to battery, which will operate relays *A* and *B*. The operation of relay *A* disconnects the drop from the line, while that of relay *B* opens the test circuit and at the same time closes the tip strand of the cord, which completes the circuit between the two subscribers. When the conversation is completed both parties "ring off," which will actuate the clearing out drop which is permanently bridged across the cord circuit, and the operator upon receiving this signal will take down her connections. In case the line desired is busy, however, the sleeve strand of the jack associated with this line will have been raised, by virtue of the plug previously inserted, to the potential of the negative side of the battery, and the operator upon testing the multiple jack of this line will receive the regular audible busy signal. This circuit is traceable from the ground on relay *A* over the sleeve strand of the jack and the tip strand of the cord, through the break contact of relay *B* and the tertiary winding of the induction coil to battery. The operator, upon learning that the line is busy, will inform the subscriber to this effect, at the same time telling him that he will be called as soon as the line desired is free for further service. It will be observed that this circuit is provided with a double cut-off key (Nos. 2 and 3), so that the operator can converse with either subscriber individually if she so desires.

Toll to Local Connection.—In a toll to toll connection the toll operator is in a position to complete the entire connection without any further assistance, but when a toll subscriber desires a local connection she must call upon a trunk operator, who is situated at the local board, for aid. The trunk circuit used to transfer the call to the local board together with a complete diagram of a toll to local connection is shown in Figure 12. As would be naturally inferred, and as is shown in this circuit, the toll line connections remain the same, but the cord circuit is no longer one complete metallic connection, but is divided into two distinct circuits —one adapted to toll and the other to local service and supervision, these two parts being connected magnetically by means of the repeating coil. The trunk circuit used is plug-ended at the local board, the trunks all terminating in the trunk operator's positions, while at the toll board it is jack ended, these jacks being multiplied in each toll section so as to be readily accessible to each operator.

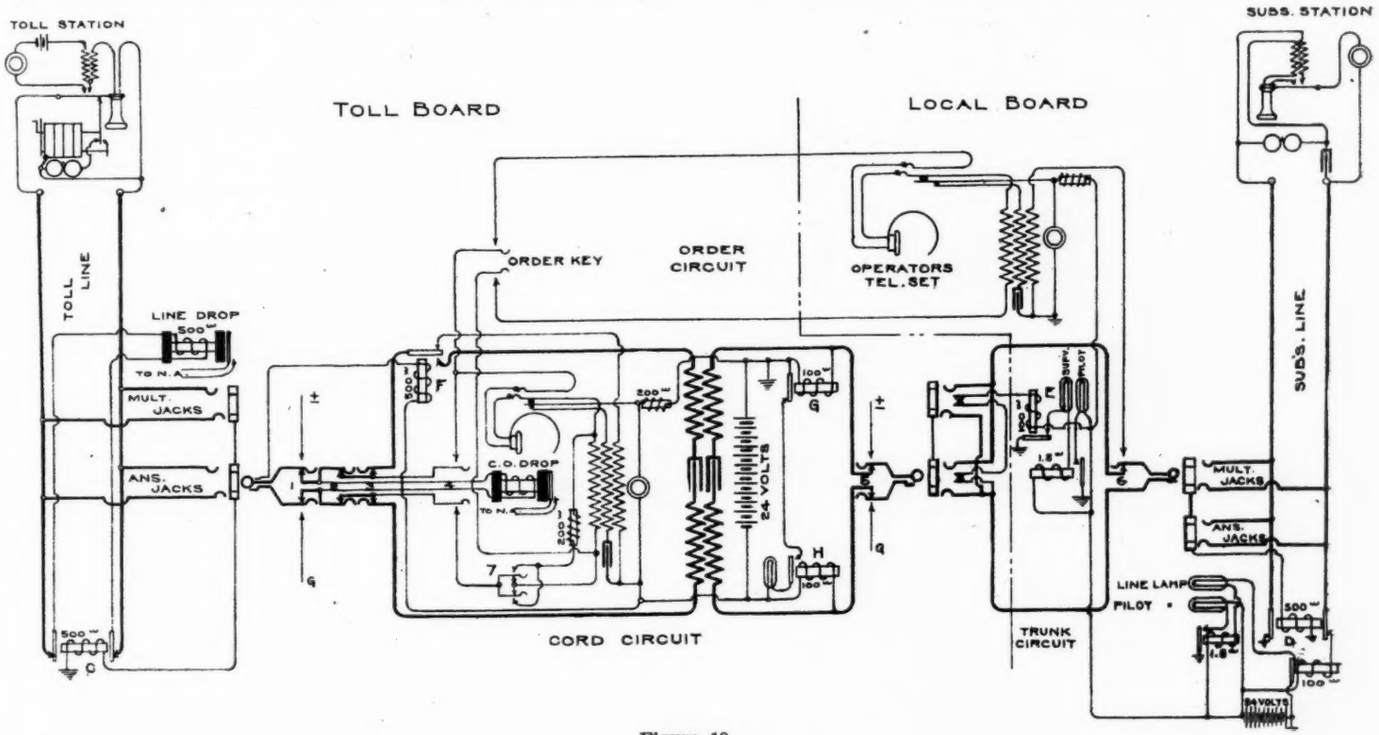


Figure 12.

The operation of the circuit is as follows: The toll operator, upon being instructed by the subscriber, who has reached the exchange in the regular manner, that a local connection is desired, will by means of her order circuit place herself in communication with the trunk operator and inform her as to the number of the local party desired.

The trunk operator upon receiving this information will operate the key (key No. 6, which is a non-locking key) associated with one of the trunks that is not in use and proceed to test the jack of the line called for, and if the same is free she will plug into said jack, at the same time giving the toll operator the trunk assignment. The plugs used with these trunk circuits are so designed that the ring conductor will short circuit the sleeve and ring springs of the jack into which they are inserted. Consequently, when the trunk operator inserts the plug, we can trace a circuit from the ground on relay *D*, over the sleeve of the trunk jack and the ring conductor of the cord, through the series contacts in the trunk jack and relay *E* to battery. Due to the completion of this circuit, relays *D* and *E* will be energized, the operation of *D* disassociating the signaling apparatus from the line, and that of *E* closing a local lamp circuit, thus lighting the trunk supervisory lamp at the local board. However, this lamp will remain lighted but a short interval, since the toll operator, upon receiving the trunk assignment, will plug into the jack of the trunk designated, thereby opening the jack contacts which will break the circuit just established and hence de-energize relay *E* causing its armature to fall back. Relay *D* will remain energized, since a circuit can be traced from the ground on relay *D* over the sleeve strand of the line, the ring conductors of the trunk and cord circuits and relay *H* to battery. This will energize relay *H*, causing the attraction of its armature, which will close a local circuit and thus light the toll supervisory lamp. The lighting of this lamp will show the toll operator that the local end of the connection has been completed, while the extinguishing of the trunk lamp will inform the trunk operator that the toll end has been completed. The toll operator is now ready to ring the subscriber, which she will do in the regular manner. When the subscriber answers he bridges his telephone set across the line, which causes battery to flow out through the cord circuit by way of the coils of relays *H* and *G*. This will operate relay *G* and the attraction of its armature will open the toll supervisory lamp circuit which will extinguish this lamp, thereby informing the operator that the local party has answered. When the conversation is completed the toll subscriber will "ring off" and consequently throw the clearing out drop. The local party, however, will simply "hang up," thereby opening the battery feed circuit and hence relay *G* will be de-energized. This will cause its armature to drop back, which will again close the toll supervisory lamp circuit and give the toll operator the disconnect signal. The operator, upon seeing these disconnect signals, will remove her plugs. The removal of the plug from the trunk jack will open the circuit through the coil of relay *H*, which will de-energize this relay thereby extinguishing the supervisory lamp, and it will also close the series contacts in the trunk jack. Thus the circuit through relay *E*, as explained above, will be re-established, and consequently the trunk supervisory lamp will light, giving this operator a disconnect signal, and she will then take down the cord and thus restore the apparatus to its normal condition. In case the toll operator orders up a local line which is busy, the trunk operator will inform her to this effect, when she can either ask the toll subscriber to wait or tell him that the line is busy, informing him at the same time that he will be called as soon as his party can be reached.

NEW USES OF THE TELEPHONE

Some of the Odd Ways in Which This Modern Convenience is Utilized

By E. M. Rothelle

THE telephone has become a veritable "maid-of-all-work," and every day's experience shows there is no limit to the uses to which it may be devoted. In rural districts, as well as in the cities, the people are daily learning new ways to utilize the invention. Its field is almost infinite. From a toy of luxury it developed into a convenience and then a necessity of modern civilization. To-day the telephone is performing so large a share of the world's work that only its loss makes the public realize how much they have come to depend on its service. The report that the Roman Catholic clergy are discussing the propriety of employing the telephone for the receiving of confessions in emergencies is only an example—though a startling example, perhaps—of the manifold uses to which the "talking wire" can be devoted. In cases where persons cannot reach the priest it is said the head of the church is inclined to sanction the intervention of the telephone, and there is, in truth, no good reason for denying the reasonableness of the innovation.

Many and strange as are the uses to which the telephone is devoted, Columbus, O., has found a way to utilize it that is unique indeed. At the Ohio capital the telephone is called into service to put a quietus on "mashers." For several months this species of "lady-killers" had been annoying women, and the police seemed to be unable to cope with them. Finally the "mashers" began to use the telephone promiscuously, and then they met their downfall. It was their custom to call up women and girls who frequently did not understand that they were talking to an utter stranger until the conversation had been in progress some time. So many complaints were made of this character that at last the Citizens' Telephone Company resolved to take heroic measures to protect its patrons. A plan was devised whereby when a private residence was called the operator at central "listened in" long enough to ascertain if the "masher" was at one end of the line. If he was the police were notified and an officer was sent post haste to arrest the offender. In some cases the women molested cleverly held the "masher" in conversation until a minion of the law could reach him. A trip to the police station followed, and after a few such experiences there was a decided falling-off in such complaints. As a check on "mashers" the people of Columbus unanimously vote the telephone a brilliant success. Since then there has been little of this reprehensible practice either over telephone wires or on the streets.

Out on the plains of Kansas, in the little city of Downs, Mrs. D. E. Allen, the librarian, has evolved a new way to use the telephone as a distributor of information. The surrounding country is populated by farmers and stock men who are subscribers to rural lines.

"I am writing an essay on John Hay; please tell me something about him," a school boy telephones the librarian from his home on the farm. Mrs. Downs makes a note of the request and during her spare time finds the information

desired and then calls up the student struggling with his "composition," and gives him over the wire the data he needs about Hay. The library is well supplied with reference books, and Mrs. Downs has made the institution popular with the aid of the telephone. She is entitled to the credit of combining the work of library and telephone, and declares that their co-operation has extended the use of each to a marked degree. In an address before the Association of Librarians of Kansas Mrs. Downs expressed the opinion that the telephone and library are among the most important factors in education, and that her experience in making joint use of both widely increases their influence. Not only the school pupils but nearly everybody in the community utilizes the telephone-library and votes it an extremely useful combination.

At West Union, Illinois, recently a trial was in progress in a justice court, when it was discovered that an important witness required by both sides had not been summoned. Investigation showed that he was at an adjoining town of Marshall, and as there was a mutual desire for haste the attorneys for the plaintiff and defendant agreed to take his testimony over the telephone. The witness was reached and the justice administered the oath over the wire. He then gave his testimony over the telephone, the questions being given and answers made through the justice. An instance of a man in Wisconsin charged with a minor offense being tried by telephone attracted attention some time ago, and demonstrated the fact that absolute reliance can be placed on the telephone in matters of court procedure.

The most notable example of the use of the telephone in court proceedings occurred at the January term of the Maryland court of appeals, when the remarkable method of arguing a case over the long distance wire between Baltimore and New York was resorted to. Judge Sharp of the Maryland court was in New York when the attorneys in a suit between the city of Baltimore and the Canton Company over the title to Canton Park desired to reach the higher tribunal without loss of time. Although in another city Judge Sharp agreed to hear the arguments and, sitting in a telephone booth in New York, listened to what the lawyers in Baltimore had to say. This is the first time a law suit ever was tried by long distance telephone.

Exchange managers all over the country agree that never before had the telephone been so generally used for the communication of holiday greetings as during the recent Christmas and New Year's season. In all the large cities one minute after midnight, December 31, thousands of telephone subscribers called up their friends to wish them a Happy New Year, and the operators at central were kept busy during the succeeding hour. The telephone message has the advantage of coming exactly "on the dot," which neither the mail nor the telegraph greetings possibly can have. New Year greetings are especially gratifying to most people when received pat on the minute, and in many cities there was a pleasant rivalry to get friends on the wire a few seconds before they could cry "Happy New Year." The younger element mischievously waited until 3 or 4 o'clock and then called friends out of bed to wish them good luck in 1907. The toll boards of companies maintaining long distance telephone service were crowded with calls by persons wishing to send holiday greetings to friends and relatives in other cities. Many companies wisely advised their patrons to make advance appointments so that they would be able to reach their party without too much delay. The experience during the recent holiday season shows that the custom of telephone greetings is growing more general every year.

As in coal mines, the telephone has lately become an important factor in lumbering operations in the woods. In Maine the number of lines has increased so rapidly that the heads of most big firms can sit in their offices and talk directly with the foremen of their gangs in the logging camps in the heart of the forest. Most of these lines run straight through the woods, the wires being strung in trees following a stream or logging road. Heavy snow storms and falling branches often interfere with the wires, but repair men are kept at hand to clear away the trouble.

The government forest reserve has installed its first telephone line, running through the Big Horn country in Wyoming, a distance of 109 miles. The principal object in establishing telephonic communication in the reserves is to assist in fighting timber fires, which are the bane of the lives of the forest patrol. The telephone enables the guards to keep in touch with the entire territory under their supervision and take speedy action to extinguish fires, usually resulting from the carelessness of hunters.

One of the most interesting illustrations of the possibilities of the telephone was furnished recently by an incident in which Senator Albert J. Beveridge of Indiana was the central figure. Senator Beveridge was billed to make an address on "The Nation's Peril" before the Alumni of the Indiana Medical College at Indianapolis, and the day before was obliged to be at Omaha. He calculated, by close connections, to arrive in time, but was delayed and, although he took a special train to Chicago, found on reaching that city that he could not possibly fill his engagement at Indianapolis. While lamenting the predicament at a Chicago hotel, a friend jokingly said: "You might telephone your speech." The senator caught at the suggestion like a drowning man at a plank and immediately set on foot an inquiry to ascertain what could be done. Of course the telephone was equal to the occasion. The alumni meeting was held in the banquet room of the Claypool hotel, and plans were begun to equip each of the 500 guests at the dinner with a receiver, enabling them to hear Senator Beveridge's address. This proved too big an undertaking on such short notice. however, and another remedy was devised for the belated orator. Senator Beveridge was given special connection with a court stenographer at Indianapolis and telephoned his entire speech. the shorthand man taking it in full. The stenographer read the address to the meeting, while Senator Beveridge, in Chicago, enjoyed the evening at the theater. The members of the alumni association missed the ringing voice and vigorous gestures of Senator Beveridge, but for all that they enjoyed the speech delivered under such novel circumstances. This is said to be the first time on record of an orator of renown making an address to an audience from which he was separated by a distance of more than one hundred miles. It is also the first time that Senator Beveridge ever delivered a carefully prepared speech to one solitary person, and for that reason the stenographer to whom he telephoned the address may therefore consider himself especially honored. At all events Senator Beveridge is more thoroughly convinced than ever before that the telephone is the greatest convenience of the age, for it enabled him to extricate himself from an awkward situation.

Experiments are being made to prove the value of the "acousticon" in telephoning the speeches delivered in Congress to committee-rooms and offices where senators and representatives may happen to be. The general plan is to wire the capitol building and connect every room with both houses of Congress. The cable carrying the wires will be attached to the acousticon, which is a sound-intensifier having the appearance of a small black metal disk, which is intended to stand upright on the desk of the presiding officer, where it will receive the sound waves. Supposing, for instance, that Speaker Cannon is detained in his private office and the house is in session. It is claimed that the speaker, if desirous of knowing what is going on in the house, can take up the receiver and hear what is being said in the chamber almost as distinctly as if he were at his post. The advantage claimed for this is that members at work in com-

mittee rooms can keep track of the course of business on the floor without having to leave their rooms. Then when a bill is taken up in which they are especially interested they can return to the floor—an advantage not gained by the old system of notifying members that a vote is to be taken by ringing bells.

"Shaving by telephone" is another new wrinkle in the utilization of the invention which saves patrons of barber-shops both time and temper. In the big office-buildings of large cities—where several thousand persons are employed—there is usually a tonsorial establishment patronized by the tenants of adjacent floors. It is the fashion of the busy business man to have the office boy call up to the barber and find out if there is a chance to be shaved without loss of time. If the chairs are full the head barber makes a note of the inquirer's telephone number and notifies him as soon as there is an opportunity to wait upon him. The scheme of making appointments with the barber over the telephone has been found to be as feasible and convenient as arranging for time with one's dentist, physician or lawyer.

Independent manufacturers report that they sold many extension telephones for Christmas presents during the holiday season. At first thought a telephone might seem a queer gift, but in many cases it is really one of the most useful remembrances a person could receive. For the invalid who is forced to spend many weary, lonely hours in bed an extension telephone which permits him to converse with his friends is not only a convenience, but a positive blessing.

Piano tuning by telephone is another novel way in which this invention was used recently for the first time. A piano tuner connected with a music store in Sterling, Ill., was sent to the neighboring town of Erie to tune a piano in a church. When he arrived he learned that the officers of the church desired another piano, and as both instruments were to be used together at revival meetings it was necessary they be alike in tone. The agent called up the music store and asked that the additional piano be forwarded at once, so he could tune them together, but found it was impossible to have the second piano delivered that day. Being a man of resources and having an abiding faith in the possibility of the telephone, the agent instructed the Sterling store to draw the newly-ordered piano close to the telephone and play it until the tuner at Erie caught the tone. Then he proceeded to tune the piano in the church so it harmonized with the instrument at the store. The experiment proved successful, as it was found that the pianos were of the same pitch and another way of utilizing the telephone had been discovered.

A town council meeting was held by telephone in Massachusetts recently because the members of the board of selectmen were unable to get together. The town is Billerica, which has a population of 3,000. The board meeting was the last of the year and of unusual importance, but a severe storm arose and a number of the city fathers decided to stay at home. In fact, two of the selectmen were snowed in. The chairman of the board happened to have a telephone in his house and another member of the board was a very near neighbor of his. The brilliant thought occurred to the chairman to call up the town hall, and, learning that both the clerk and the other member of the board were in attendance awaiting the arrival of the detained members, he suggested that the board's business might be transacted by telephone, so an arrangement was made with the telephone company by which the parties were connected each with a separate instrument. Reports were read, appointments made, election officers designated, warrants drawn—in fact, all the important business of the closing meeting of the board of selectmen of this important town in Massachusetts was transacted over the telephone.

Undoubtedly the most singular use to which the telephone has ever been devoted was the manner in which a New York woman utilized it. Mrs. J. H. Holden, wife of a minister, was lying ill in bed when her husband was stricken down and died. When the funeral was held she was unable to leave her bed, and was nearly heartbroken because she could not go to the church where the services were to be held. One of the parishioners took the matter up with the local telephone company with the result that a line was run from the church to the sick chamber, enabling the widow to hear the sermon preached over the remains of her deceased husband as well as the prayers and hymns that were said and sung.

TELEPHONES IN JAPAN.

When a Japanese dies in Tokio one of the assets of his estate is his telephone, and the privilege of taking over the dead subscriber's instrument is worth, according to the Boston Financial News, just $400 to his heirs.

The government of Japan is interested in telephones for the reason that such instruments of communication are a monopoly in the little empire—a government monopoly. It is a fact of world-wide recognition that governments as a rule do not pay particular attention to industries which they may happen to possess a monopoly of—and this maxim is apparently true of Japan, though it is possible that Japanese telephone systems may be modernized.

The great complaint in Japan is not so much against the quality of the instruments and equipment of the systems as against the total inability of the government to supply service to all would-be subscribers. To get a telephone in Tokio a man either has to buy out a subscriber or wait his turn to secure an instrument, and there are no fewer than 8,000 people on the waiting list ahead of him. The government is unable to supply the demand, for the simple reason that it has not the instruments, and has not the working force to install the telephones if it had them.

In Japan telephones are rented to subscribers at a flat rate; it makes no difference for what purpose they are used. A telephone for a private house costs just as much as one for a business office. In the city of Tokio, which has a population of a million and a half people, there are 22,000 telephone subscribers and thousands more who would willingly give $100 to secure accommodation.

The cost of a telephone in Tokio is $40 per annum, and that is gold, not silver, and the amount is payable strictly in advance. While the receipts of the government from its telephone monopoly are large, the cost of operations is comparatively light. For instance, it pays its linemen, the best of them, at the rate of fifty cents per day, and the nine-hour day has not yet been introduced in Japan.

Notwithstanding the fact the net earnings from the telephone system of Tokio are very large and there is therefore every incentive to supply as many customers as possible, the government has so far found it impossible to keep even with the demand. In Tokio alone it is estimated that some four years will elapse before the government will be able to supply an instrument to the last man who puts his name on the waiting list. Of course many would-be subscribers die before their turn comes, and the man has the doubtful consolation of knowing that chances may throw an epidemic of disease among those on the waiting list, and, though he be spared, his chances of getting an instrument during his lifetime are immeasurably increased by the deaths of the others.

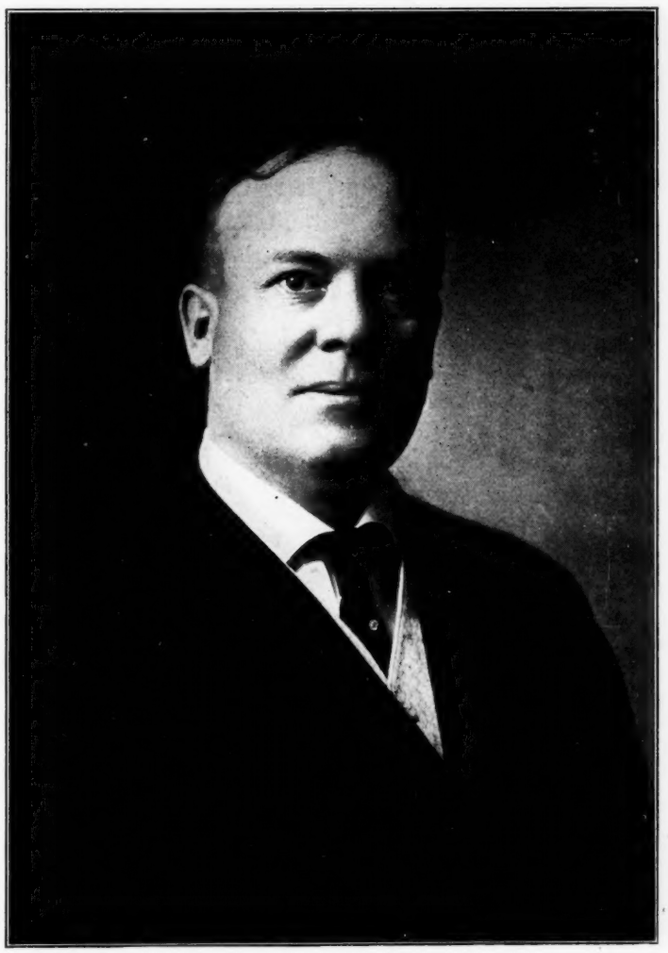
At Calgary, Canada, a municipal telephone system will be installed if ratepayers vote the funds. The high rates of the Bell company have led to this action.

MANUFACTURERS DEPARTMENT

GEORGE W. BROWN PROMOTED.

George W. Brown, the new secretary-treasurer of the Chicago Telephone Supply Company, is well and favorably known almost everywhere that telephones are sold. He won his spurs on the road and for the last two years has been present in the interests of the "telephones that satisfy" at the letting of almost every large order. His first venture as a telephone salesman took him to Nebraska when Independent telephony was just beginning to get a foothold in that state, and he secured thirty-two of the first thirty-five new exchange orders on which he figured.

Such a record is considered remarkable in these days of fierce competition and attracted the attention of other factories who sought to enlist his services in their behalf. Although offered material inducements by other factories, Mr. Brown had no temptation to accept them, as he had developed so much enthusiasm for Chicago telephones that he felt he could not with justice to himself advocate another line of apparatus. So he carried the grip in Nebraska until about two years ago, when he was made general salesman with headquarters at Elkhart, Indiana. Since that time he has devoted his time to large competitive deals in all parts of the country, and his continued success has demonstrated the quality of his ability and the sincerity of his enthusiasm. When H. C. Randall resigned as secretary-treasurer of the Chicago Telephone Supply Company, Mr. Brown was unanimously chosen by the directors to fill the vacancy.



George W. Brown.

Although the duties of the new position are different Mr. Brown is attacking them with such ability and enthusiasm that the company already is congratulating itself on its choice. In his experience on the road Mr. Brown has gathered much information about the efficiency, durability and popularity of almost all types of equipment, and such knowledge will doubtless be of inestimable value to him in helping to shape the affairs and policy of the company. As a matter of fact his advice has already been sought when changes in equipment have been under consideration.

After the engineering department had developed a model embodying such changes and had tested its efficiency and durability, it has heretofore been the policy of the factory to be guided by Mr. Brown's opinion as to whether a change was desirable, and, if so, whether the particular form of the new design would prove popular with the trade. In these respects his judgment has been unerring and the engineering department has received many valuable suggestions from him.

From one point of view his salesmanship has been peculiar, since he has never been able successfully to sell any part or complete instrument until he was convinced that it embodied every known feature that was good and desirable. Once convinced, however, that any part or instrument was abreast of competition his enthusiasm quickly found expression in orders. Since the announcement of his promotion Mr. Brown has been much gratified by the number of congratulatory letters he has received from the friends he has made in the trade. These have demonstrated more than anything else the worth of honest effort and conscientious industry, both as a means of making friends and as a commercial asset.

CONDUITS OF HIGH GRADE.

It is a long call from the old, one-horse brick yard to the modern ceramic establishments. Scientific progress in ceramics is now an assured fact and telephone and electric people are profiting by it. The high potential insulator has made long distance electric roads possible, and managers and engineers will not be slow in expecting the same high grade, uniform product in underground conduits. The cost of laying conduits and the importance of the service make it vital that nothing but first-class ducts be laid.

Among manufacturers of sewer pipe and conduits the Rochester Sewer Pipe Company, at Rochester, N. Y., is a notable example of progress in that line. This firm's policy is to make the best ducts possible, and a recent inspection of its product leads to the conclusion that it has left no stone unturned to accomplish this end. The Rochester Sewer Pipe Company has been in business thirty-five years, and this long experience, together with a knowledge of modern progress in clay working, enables it to accomplish much in the way of uniformly high-grade conduits.

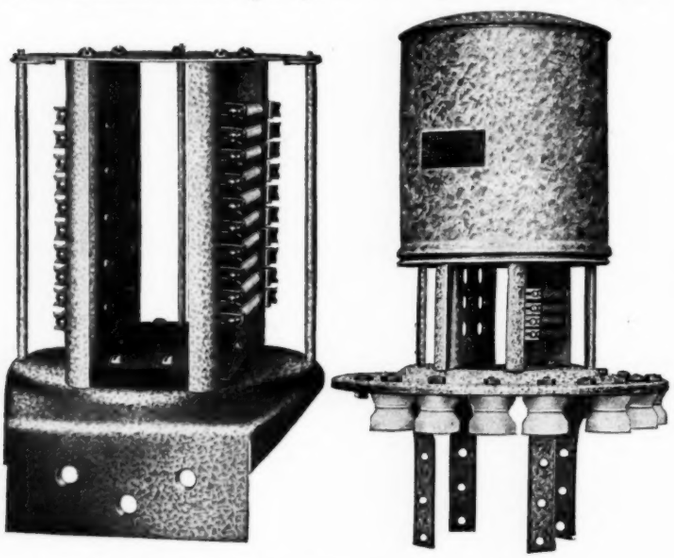
The clays employed are selected and watched by a ceramic chemist who is very careful to have them suited to the ware being made. They are then weathered to remove soluble and vegetable matter and to improve their working qualities. The clays are thoroughly ground and tempered, thereby giving a homogeneous body and straight ware, free from cracks and bubbles. The conduits are made on high pressure steam presses, after which they are carefully dried. Men of experience then inspect every duct

before it is set in the kiln. All ducts showing the slightest defect or internal strain are rejected. The burning, being the crucial stage, is given great care and study, being guarded throughout by skilled men under the supervision of a trained expert. The Rochester Sewer Pipe Company uses the Le Chatelier electrical pyrometer, which, by making perfect control over the heat possible, permits proper maturing of the body, good vitrification and thorough salt-glazing.

Its product justifies the Rochester Sewer Pipe Company's great care, and it is pronounced fit to last for ages. No under-burned ducts are shipped. By the use of such conduits there is said to be a gain in insulation and strength, less absorption and a longer life. This makes a strong, practical appeal to those who are doing underground work which is designed to last and be free from moisture and short circuits. W. H. Gorsline, secretary and manager, is glad to show visitors through the works and yards at any time, and is prepared to demonstrate all of the above claims.

COOK'S PRESSED STEEL TERMINALS.

Frank B. Cook invites especial attention to his "all metal" terminals, claiming that they have numerous advantages over terminals made partly or entirely of wood. Cook's



Type T-16—Showing Cover Removed. Type T-18.

terminals are constructed entirely of pressed steel, and no castings are used in their construction, making a terminal very light in weight and exceedingly strong. The chances of breakage, it is said, are entirely done away with in the pressed steel terminals.

The all-metal terminals also have absolutely no woodwork to swell, split or warp and they cannot possibly burn up when a high voltage current goes through the arrester. Furthermore, their covers will always slide up and down easily and will not stick in damp weather. Every cable man will appreciate this non-sticking feature. All the metal parts of the new Cook terminals are heavily galvanized so they cannot rust. The covers are made of sheet steel, which is also heavily galvanized, and the terminals are therefore exceedingly durable. Mr. Cook considers that his type S-4 terminal is the best on the market. This terminal has the tubular fuses and carbon lightning arresters, mounted on a sheet metal, moisture proof cable box, and the protectors are so arranged that connections are very easy of access.

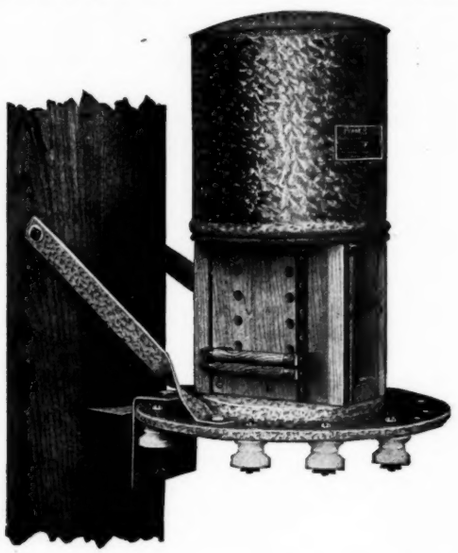
The cable is brought in through the self-soldering nozzle shown in the illustration, and the conductors are fanned out and soldered to the clips inside the moisture proof cable box, the front plate or cover being removed for this purpose. Mr. Cook also makes this terminal so that the cable wires can be brought through a hollow rivet and soldered outside of the box. This makes the cable connections very easy of access at all times.

After the cable wires have been distributed and soldered, the front plate may then be fastened on securely, a rubber

Type S-4—Showing Cable Inserted, Cover and Front Plate Removed.

gasket rendering the joint moisture proof. The back of the box, inside, is lined with an insulating fiber, to prevent the cable wires from grounding on the box.

As an additional protection to the cable, the plug in the top of the box may be unscrewed and the box filled with parafine or compound. No pot-head is necessary with this terminal, as the box itself forms a moisture-proof ending



Type T-17—Combined Terminal and Distributing Ring.

for the cable. The jumper wires are soldered to the rear connection, and are led out through holes in the base plate.

The types T-16, T-17 and T-18 are all made for use with pot-heads. As in all Cook types of terminals, they are equipped with special springs which hold the covers in place when they are raised and which also lock them in place when they are down. This makes it unnecessary to hang the cover up on the pole or to have a chain from which the cover dangles while it is off.

These three types of terminals are all equipped with indi-

vidual protector mounts, which can be put on as needed. Any initial capacity can thus be secured and the capacity of the terminal can be increased as desired by simply adding protector mounts. These terminals are designed particularly with a view to economy in first cost and are especially recommended for multiple tap cable work. All the terminals are made for either solder or screw connection.

Mr. Cook claims that his new and original method of forcing the fuse contact springs through the hard rubber blocks is a very radical improvement. The blocks are heated and the springs are forced through so that when the rubber has cooled again, the springs are held absolutely rigid. It is claimed that this construction also prevents any surface leakage, on account of moisture collecting on the blocks between the springs.

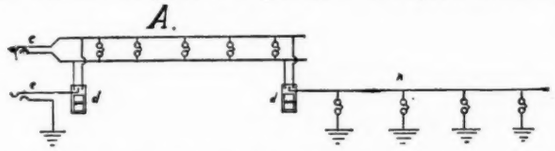
Type T-16 is arranged for fastening to the side of the pole. Types T-17 and T-18 combine the terminal and distributing rings. The protectors can be mounted, one pair at a time, and the porcelain knobs can also be added, severally, as needed. Type T-17 is arranged to fasten to the side of the pole and type T-18 is for the top.

Mr. Cook also makes a great variety of other terminals for various purposes.

THE STANDARD SPECIALTIES.

The Current Electric Company, Chicago, has sold a great many of its pole changers and duplex sets to telephone companies within the past few years, and reports that all are

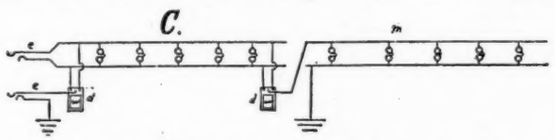
A.



giving satisfaction. It is claimed that the Current Electric Company's duplexing device will double one's telephone service without building additional lines.

The Standard duplex sets are made for metallic bridging lines, metallic toll lines, trunking lines, etc., as they render

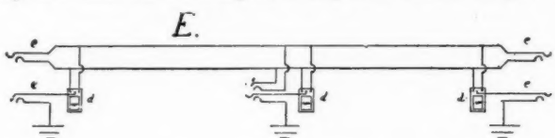
C.



one or more additional talking and ringing circuits, according to the original number of circuits and number of instruments used, without cross-talk or disturbance to the original lines.

They are said to be simple, inexpensive and easy to con-

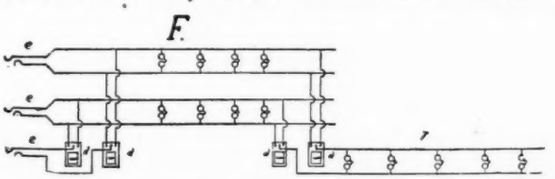
E.



nect, have no movable parts or contacts to wear out or get out of order and are well protected by lightning arresters.

Figure A represents an extension or branch line which may be connected anywhere on the metallic circuit or if

F.



connected to any single party along the line will render him private service.

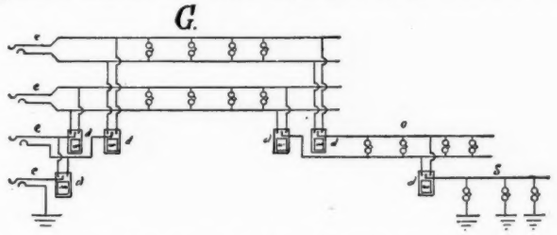
Figure C illustrates an overloaded metallic line divided.

Figure E shows an extra duplex circuit for three toll stations, with one and one-half duplex sets.

Figure F shows an extra metallic circuit obtained by the use of two Standard duplex sets.

Figure G shows how two duplex circuits may be secured

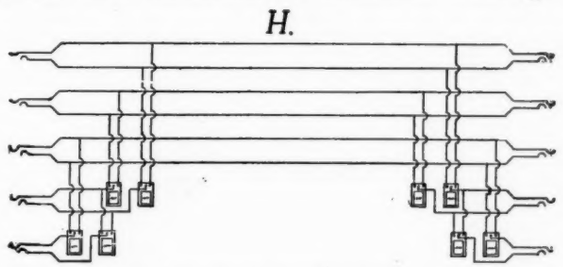
G.



from two metallic circuits by the use of three Standard duplex sets.

Figure H shows how two additional metallic circuits may be obtained from threee metallic circuits on trunking lines,

H.

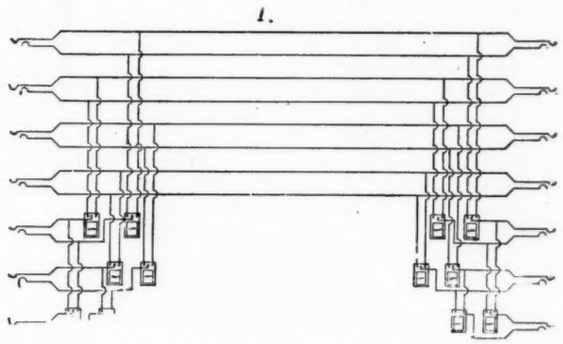


etc., by using four Standard duplex sets.

Figure I illustrates four metallic trunking circuits with three additional metallic circuits by the use of six Standard duplex sets.

It is said that the only requirements to use these instru-

I.



ments for any of the above mentioned purposes on telephone or telegraph circuits is to have ordinary good metallic lines and keep them clear of the ground.

Orders will be filled by the Current Electric Company for one or more sets on thirty days' trial without obligation and if not found satisfactory may be returned at the sender's expense.

WIRE & TELEPHONE COMPANY OF AMERICA'S NEW PLANT.

It has come to the attention of the Wire & Telephone Company of America, at Rome, N. Y., that since the fire which destroyed a portion of its plant on February 23, 1907, reports have been circulated that this will affect the company in taking care of its trade. This company is particularly anxious to have the trade know that the fire will in no way hamper it in the matter of delivery of various products. The fire destroyed only that part of the plant in which the bare copper wire was drawn, and immediate arrangements were made for the drawing of copper by other mills. The Wire & Telephone Company of America was just about to erect a large addition to the plant, which, in connection

with the rebuilding of the wire mill, is now well under way. When these buildings are completed the company will have one of the most modern wire manufacturing plants; also, a new and modern building to take care of its telephone business. The new buildings in course of erection will be of brick and steel construction, absolutely fire-proof, and the entire plant will be equipped with a sprinkler system. Having a pumping station of its own, and water tanks of sufficient capacity, will give the company independent fire protection. The entire plant will be operated by electric power, the equipment being so arranged that the machinery can be driven independently in groups. The handling of copper throughout the works will be done by pneumatic hoists, and all machinery and equipment will be such as experience has demonstrated to be best adapted for the economical production of high class work.

STERLING INSULATED WIRE COMPANY.

The Sterling Insulated Wire Company was recently launched in business with commodious quarters at 240-244 West Lake street, Chicago, Ill., where will be produced a complete line of bare iron wire, weatherproof iron wire, bare and weatherproof copper wire, annunciator and office wire and galvanized strand.

S. Mankowitz,
Proprietor, Sterling Insulated Wire Co., Chicago.

Samuel Mankowitz is sole proprietor of the new concern. Mr. Mankowitz is widely known throughout the telephone field, being the founder of the Monarch Electric & Wire Co., of which he was for several years the president prior to the time when he severed relations with that company in January last. Feeling that he has the experience, acquaintance and capital necessary to make a complete success of his undertaking, Mr. Mankowitz will in his new surroundings seek to carry out ideas and plans according to his personal preferences, and will undertake to treat all of his friends as he feels they are properly entitled. He is more than pleased with the patronage accorded him at the very outset by many of the best concerns in the telephone and electrical fields, and states that he will care personally for all to the very best of his ability. He wishes to thank his many friends in the telephone field for past and present favors.

A part of the Sterling equipment, which includes the finest machinery to be found, is already installed and producing daily. By June 1st, Mr. Mankowitz expects to have enough equipment running to insure a daily output of over 200,000 feet. His is said to be the most modern wire plant in the West.

A TESTIMONIAL TO TUBE FLUX.

Mr. E. J. Burke, president of the Blake Signal & Manufacturing Company, 246 Summer street, Boston, has received the following unsolicited testimonial as to the desirability of the Blake tube flux:

"Dear Sir: We have been using the sample of your tube flux in the telephone laboratory and have found it very convenient. Your idea of placing the compound in this firm is certainly to be commended. We are daily doing more or less soldering, and the ordinary stick flux does not last long, due to waste. You have made a decided advance. Yours truly, Arthur Bessey Smith, Department Telephone Engineering, Purdue University."

MACK & CO.'S TELEPHONE TOOLS.

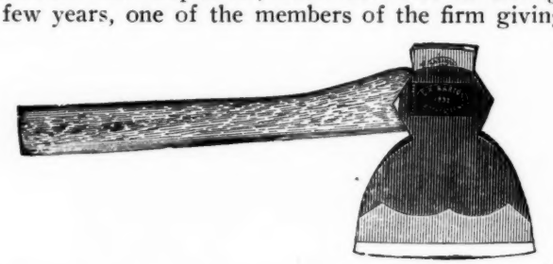
The firm of Mack & Company, Rochester, N. Y., is offering the telephone trade a high grade line of tools, embracing hand axes, chisels, drawing knives, etc. Mack & Company are the sole makers of the Barton brand of tools. The

The Barton Trade Mark Used by Mack & Company.

former head of the firm, W. W. Mack, went into partnership with D. R. Barton in 1866, and was actively engaged with him in the manufacture of the Barton tools until a short time before his death, which occurred April 26, 1875. Since the formation of the partnership with Mr. Barton in

1866, Mr. Mack was, with the exception of about two years, constantly and actively engaged in the making of these tools, until he retired on account of failing health in 1899, since which time his sons, Wm. R. and Amos P. Mack, have carried on the business, they having been associated with him for many years. Their experience in the making of these famous tools reaches back over a quar-

ter of a century. Mack & Company are said to spare no pains or expense to maintain the reputation for superiority which the Barton tools held for so many years, the finest English steel and the most skilled and experienced workmanship entering into their manufacture, and at no time in their history has such extreme care, both in their manufacture and inspection, been exercised as during the past few years, one of the members of the firm giving his



personal supervision to the manufacturing of the tools. These tools are sold throughout the United States and Canada, and to a considerable extent in foreign countries. Being satisfied that there are many mechanics throughout the country who have used the Barton tools and would prefer them to any other brand if they could readily be obtained, but who do not find them at their local hardware dealer's, because he can make more money on cheaper and inferior goods, Mack & Company adopted the plan of placing price lists directly in the hands of the mechanics and buyers who use the tools. If your hardware dealer does not keep the Barton goods and refuses to order them, you are requested to write Mack & Company for a price list direct.

TRADE NOTES.

THE ILLINOIS ELECTRIC COMPANY will send its net price list and discount sheet for April to all interested parties.

M. W. DUNTON & COMPANY, Providence, R. I., send free a sample of Nokorode soldering paste sufficient to solder 100 joints.

M. C. STONE, Washington, D. C., manufactures seamless paper sleeves, particularly well adapted for telephone cable splicing.

THE YONKERS SPECIATY COMPANY, Yonkers, N. Y., has issued a new booklet, descriptive of its cable clips, ground clamps and expansion plugs. Free to all interested.

THE GENERAL STORAGE BATTERY COMPANY, 42 Broadway, New York City, is issuing a valuable instruction book concerning the installation and operation of transportable batteries.

THE SIOUX FALLS (S. D.) BRANCH of the Swedish-American Telephone Company, is rapidly meeting with favor among telephone buyers throughout the West and Northwest.

DETROIT INSULATED WIRE COMPANY, Detroit, Mich., advertises that it can make immediate shipment of rubber insulated, twisted pair drop wire. Its new factory is modern in every respect.

THE F. BISSELL COMPANY, Toledo, Ohio, has sold 100 pole seats to the Mt. Vernon Home Telephone Company of Mt. Vernon, Ohio. The high grade of the products of the F. Bissell Company insures their giving satisfaction.

FISHER-STEVENS COMPANY, Charles City, Ia., is making a specialty of sound-proof telephone booths. It can supply booths from stock or make up special designs to order. Catalogue and prices will be sent on receipt of a request.

ST. PAUL ELECTRIC COMPANY, St. Paul, Minn., carries 2,000,000 linear feet of Washington fir cross-arms in stock at St. Paul, which is a convenient distributing point. The company carries also a full line of construction material.

THE CLIFTON MANUFACTURING COMPANY, of 65 Brookside avenue, Boston, Mass., manufactures a very complete line of insulating tapes and compounds as well as the widely known "Clifton" iron armored conduit for electrical purposes.

THE SWEDISH-AMERICAN COMPANY reports that shipments are showing a substantial increase every week. This is also true of the branch at Kansas City, Missouri, from which point shipments are made to western and southwestern points.

DESK TELEPHONE CORDS, receiver cords, tinsel switchboard cords, steel conductor switchboard cords, cord tips, and special cords and cordage are all attractively described and illustrated in Stromberg-Carlson's new booklet on "Cords." It will be sent gratis.

THE FAHNESTOCK ELECTRIC COMPANY, Brooklyn, N. Y., is sending out a very attractive post-card relating to the merits and uses of its patent, spring binding post. The Fahnestock post has made good and appears to grow stronger with the trade each year.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, has just issued a new catalogue of its complete product. This catalogue outdoes all of the company's former efforts in this direction, and should be in the hands of every Independent telephone man. Sent on request.

JULIUS ANDRAE & SONS COMPANY, Milwaukee, Wis., wants every telephone buyer to have a copy of the new folder on the "Andrae Giant." This folder presents a long list of testimonials from satisfied customers all over the country, and makes a very convincing argument.

W. N. MATTHEWS & BRO., 226 North Second street, St. Louis, report that they recently received an order for fifty Hargis cable splicing joints from the postmaster-general's department, Hobart, state of Tasmania, commonwealth of Australia, as a direct result of an advertisement in TELEPHONY.

THE CRESCENT LUMBER COMPANY, formerly the Glenn-Kline Lumber Company, has moved to larger quarters in the Machesney building, Pittsburg, Pa. This firm is especially well equipped to furnish cypress and chestnut poles promptly, and all inquiries and orders sent it will receive careful attention.

THE WESTERN ELECTRIC COMPANY, Omaha, Neb., has issued a series of neat folders telling about its growth and special facilities with regard to cross arms, pins and other telephone equipment. It is predicted that these commodities will soon experience a rise and prospective purchasers are advised to order now.

THE CENTRAL ELECTRIC COMPANY, Chicago, has issued, under date of April, 1907, its confidential trade discount sheet and price list, applying to its 1906-1907 catalogue, No. 24. This has been revised to date and cancels all previous quotations. It is desired that a copy of this price list be in the hands of every telephone buyer.

THE EVERSTICK ANCHOR COMPANY, St. Louis, Mo., has received a letter from the LaBelle Telephone Company, LaBelle, Mo., stating that the Everstick anchor has been given a thorough trial on a corner pole holding twelve wires, in a low place where water stands continually, but the anchor has not moved the fractional part of an inch.

THE AMERICAN CONDUIT COMPANY, Chicago, is mailing out post cards, descriptive of Mr. R. Cline's scheme for stringing underground conduit by the rat and ferret method. The illustration on these cards almost tells the story at a glance but further particulars can be gleaned from the American Conduit Company's bulletin, No. 213.

F. E. KOHLER & COMPANY, Canton, O., manufacture the Universal post digger, which is claimed to be just the thing for digging holes to take telephone poles. Advantages mentioned are that it is strong and durable, easily operated, works in all kinds of soil, saves time and money in planting poles. Particulars will be sent on request.

THE MERKEL MOTOR COMPANY, Milwaukee, Wis., is introducing the 1907 model "Merkel" spring frame motor cycle, for the use of trouble and repair men. During the

past few years many up-to-date companies have purchased motor cycles for their men, resulting in securing a bigger day's work, which more than pays for the investment.

THE GREENBRIER POLE COMPANY, Charleston, W. Va., has issued a booklet on "Chestnut Poles," which it will be glad to send gratis to all prospective purchasers of poles. The Greenbrier company claims to cover the best chestnut territory of West Virginia and Kentucky and states that it is in position to furnish fine stock promptly and at reasonable prices.

THE DEARBORN ELECTRIC COMPANY, Chicago, has issued a new telephone catalogue, No. 38, which illustrates and describes a most complete line of telephone goods. It should be in the hands of every telephone buyer. The Dearborn Electric Company claims to carry one of the largest lines of supplies in the West and makes immediate shipments from Chicago stock.

THE FIRM OF JOHN H. FOWLER & COMPANY, Chicago, has issued a little treatise on "Cypress Poles," which will interest all buyers of telephone poles. It is claimed that cypress is more durable and cheaper than almost any other kind of pole, and the logic of the case is attractively presented in Fowler & Company's booklet which will be sent free, to any address.

THE SELECT TELEPHONE MANUFACTURING COMPANY, Springfield, O., will mail prices and descriptive matter of its central energy party line lockout device, over 1,000 of which are in use in the state of Ohio alone. The necessary apparatus can be connected to any make of common battery telephone and will work in connection with any common battery switchboard.

THE ELECTRIC APPLIANCE COMPANY, Chicago, San Francisco, Dallas and New Orleans, is mailing bulletins Nos. 5 and 6 to the telephone trade. These bulletins illustrate and describe the company's improved "Eaco" switchboard and telephone equipment. The Electric Appliance Company will be glad to send sample parts for inspection, and solicits specifications.

THE BLAKE SIGNAL & MANUFACTURING COMPANY, Boston, Mass., has established the following agencies for its Blake tube flux: George F. Schoen, 108 S. Forsyth street, Atlanta, Ga.; Syles R. Fralich, 269 S. Canal street, Chicago; Wesco Supply Company, St. Louis; Brooks-Follis Electric Corporation, 212 First street, San Francisco, Cal., and the Norton System Telephone Company, Toronto, Canada.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., will be pleased to send to all interested parties its new illustrated booklet "How the Telephone Helps the Farmer." This book tells how to organize rural companies, outlines model constitutions, by-laws, etc., and shows how to install lines and telephones. It is well worth getting and reading. Sent free, postage prepaid.

THE FIRM OF M. W. DUNTON & COMPANY, Providence, R. I., reports that in the first two months of this year it has done as much Nokorode business as in the first six months of 1906. Every box of Nokorode is put up with the same pains that is used by a druggist in compounding a doctor's prescription, and Dunton & Company guarantees every box that is put out. This firm also makes cotton tapes and sleevings for insulating purposes, and sells quite a large quantity of its regular sleeving for insulating joints in lead cable. Samples of this tape and sleeving, as well as the Nokorode paste, will be sent to every telephone man mentioning TELEPHONY.

THE MASSACHUSETTS CHEMICAL COMPANY, Walpole, Mass., has just issued a new catalogue which it desires to place in the hands of every telephone buyer. This catalogue is very neatly arranged with cuts and full descriptions of the company's various lines of goods, including tape, splicing compound, insulating paints, shellac, etc. It is bound in loose leaf style and additions will be made to it from time to time.

THE AMERICAN AUTOMATIC TELEPHONE COMPANY, Rochester, N. Y., has published a new booklet descriptive of its automatic telephone apparatus. Among the headings in this book we quote the following, which will give readers an idea of its character: Secret, Uniform, Quicker, Reliable, Cheaper, Central Energy, Only Two Wires, Party Lines, Pay Stations, Metered Service, Switches, Lamp Supervision and Sub-station Selectors. The book will be sent free upon request.

THE WESCO SUPPLY COMPANY has just issued a new bulletin, No. 75, pertaining to the products of its new telephone factory. The bulletin covers a complete list of magneto telephones and switchboards, as well as prices on materials and supplies for telephone line construction. The Wesco company attributes the phenomenal demand for "Wesco" telephones this season to the standard of quality which it has persistently maintained in the preparation of all its telephone equipment.

MR. A. J. KENNEDY, who has been with the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., for a number of years, in the engineering and later in the sales department, has associated himself with the Wire & Telephone Company of America, Rome, N. Y., as traveling representative of this company's sales department. Mr. Kennedy has a wide acquaintance in the telephone field, and should be no small factor in developing the sale of this company's rapidly increasing business.

THE CARBOLINEUM WOOD PRESERVING COMPANY, Milwaukee, Wis., is prepared to send out copies of letters received from prominent engineers of telephone companies and other large users of wood, showing the actual results obtained by the use of its compound, Avenarius Carbolineum. Although this materially increases the life of telephone poles, the result is obtained at a comparatively low cost, owing to the manner of application. All that is necessary is to apply it with an ordinary paint brush.

WILLIX & YOUNG, Mt. Vernon, Iowa, have met with great success in the sale of their secret calling device. This attachment is designed for party lines, either metallic or grounded. It necessitates no relay, no batteries nor push button on the telephone. On metallic lines it requires no ground on the telephone. Willix & Young have received inquiries and orders from all over the world for this device. Last month several Mexican companies were added to their list. Circular matter will be furnished all inquirers promptly.

THE ACME TELEPHONE & MANUFACTURING COMPANY, Albia, Iowa, is enjoying the best trade in its history this year. Acme apparatus is widely known and appreciated, and in its new location the company enjoys much better working facilities as well as more ample capital. These advantages enable the company to manufacture its full line of apparatus to the very best advantage and give its cus-

tomers all of the attendant benefits. Every telephone man should have the Acme's "Blue Book" in his possession. It will be sent postpaid upon request.

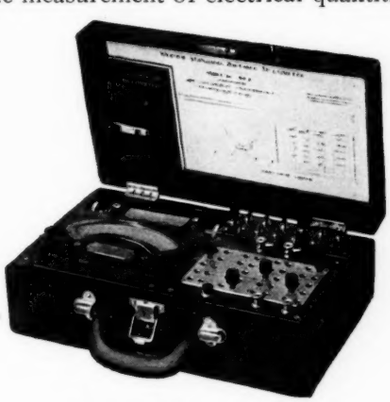
CYRUS O. BAKER, known to his friends in the electrical field as the "Platinum King of America," has returned from a month's trip with his wife through the West Indies. They had a very enjoyable trip, visiting all points of importance, including the Panama canal section. At Havana, C. W. Baker, whose wife had accompanied the party, met his brother, and the tourists spent several days visiting Cuba. Mr. Baker states that the ruins from the earthquake at Jamaica are very impressive, and he thinks it will be a long time before the community recovers from the disaster.

THE INDIANA STEEL & WIRE COMPANY, Muncie, Ind., has published a neat, new booklet, descriptive of what it terms the "best wire, indorsed by the best known authorities, made by an Independent mill, and shipped promptly with the most liberal freight allowance." It would seem that a proposition of this kind would be sufficient to merit a large trade. The new book contains reports of tests made by various universities and engineers and purports to show conclusively that the Indiana Steel & Wire Company's product is superior in every way. The company will be pleased to send this book and samples, together with information regarding freight rates and delivered prices to all interested parties.

THE MANHATTAN ELECTRICAL SUPPLY COMPANY, New York and Chicago, comes to the front with a new book styled condensed catalogue No. 22, and covering "Something Electrical for Everybody." It contains 144 pages and over 750 illustrations of goods manufactured and handled by the Manhattan, and is said to be the most comprehensive catalogue for its size ever published. It includes electrician's supplies, telegraph instruments and supplies, automobile and motor boat sundries, telephones and telephone supplies, electrical novelties, burglar and fire alarms, automatic gas lighting specialties, linemen's equipment, medical apparatus and laboratory supplies—in fact anything and everything pertaining to electricity. Sent free to any address.

THE NEW WESTON MULTIMETER.

The Weston multimeter is a new form of electrical measuring instrument which possesses a very wide range of usefulness in the measurement of electrical quantities. It is an



New Weston Multimeter.

instrument which is advertised to accurately serve the purposes of a direct-current voltmeter, milli-voltmeter, ammeter, mil-ammeter, ohmmeter, ground detector and Wheatstone bridge. The scope of measurements which may be made with the multimeter is exceptionally large, and a much higher degree of accuracy is said to be obtainable with it than with any so-called "universal instrument" known.

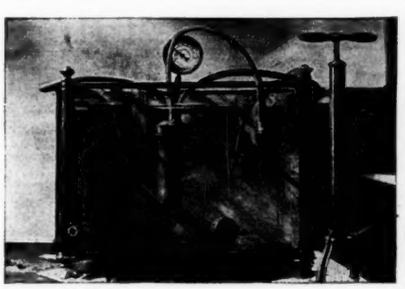
The instrument is furnished in the following combination of ranges only: Voltmeter, .075 volts, 3 volts, 150 volts, 750 volts. Ammeter, .015 amperes, 1.5 amperes, 15 amperes, 150 amperes. Bridge, 3 dials, measuring to 999 ohms with even ratio arms.

IMPROVED CALLAHAN CABLE ROLLER.

The Callahan cable roller, which had already met with wide approval from the telephone companies all over the country because of its simplicity, durability and economy, has been greatly improved by a recent change in its construction. Formerly both handles were brought down in the same direction which made it somewhat inconvenient for a lineman to clamp them down on the messenger wire. By reversing the handles so that they pull down in opposite directions and therefore against each other, which is shown in the accompanying drawing, the speed with which these rollers can be clamped on the messenger is greatly increased. The Callahan cable roller is made of malleable iron throughout and has no sharp edges to injure cable armor. W. N. Matthews & Bro., 226 North Second street, St. Louis, Mo., are the manufacturers of this money-saving specialty.

HARGIS SPLICING JOINTS MOISTURE PROOF.

We are advised by the manufacturers of the Hargis cable splicing joint that they have had several letters from telephone companies which expressed a doubt as to claims made for its moisture - proof features. To prove that this device is positively moisture proof when used according to directions this test was recently made in St. Louis:



An ordinary gold fish tank was filled with clear water and a No. 2 Hargis splicing joint immersed, which had previously been connected to a pressure gauge and a foot pump. When the air pressure was applied on the inside of the joint no leaks, however small, developed, as no air bubbles escaped through the water. They recommend this test to any who think that the Hargis joint is not absolutely moisture proof. For further information regarding this device write W. N. Matthews & Bro., 226 North Second street, St. Louis, Mo.

SOME DEAN ELECTRIC NEWS.

The new Erie (Pennsylvania) board will soon be shipped from the Dean factory, Elyria, Ohio, to replace the old Paca-Miller system, in which the board proper consists of multiple jacks only, the drops being on the wall above and

in the rear of the board. The new board is a common battery multiple 6,000 capacity board with 2,380 lines equipped and ready for service, also forty magneto lines for rural service. The shipment also includes a three-position chief operator's desk and three-position wire chief's desk, both being provided with space in the center for card indexes. Main and intermediate frame and relay rack, and complete power plant, except the battery, are all furnished by the Dean people. A standard Dean four-party harmonic outfit in duplicate for ringing accompanies the new board, which is further equipped with Dean line and cord test on every position.

The following order from Sheboygan, Wisconsin, has been received by the Dean company: A common battery multiple, 3,000 ultimate capacity, switchboard equipped with 1,260 lines and twenty rural lines, a chief operator's desk, wire chief's desk, intermediate frame, relay rack, complete power plant and Dean harmonic converter for ringing. The installation also includes individual ringing keys on each position of the board, and Dean line and cord test on each position.

Fulton, New York, has ordered a Dean common battery multiple 2,000 ultimate capacity switchboard with 560 lines equipped, also a chief operator's desk, main and relay racks and complete power plant, including the Dean harmonic four-party ringing outfit, cord and line test on each position.

Berea and Carey, Ohio, and Pt. Pleasant, W. Va., each have ordered magneto switchboards arranged for 450 lines, 300 lines and 400 lines, respectively. These shipments also include Dean full harmonic converter equipment for ringing.

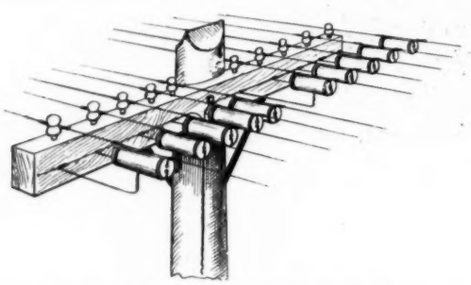
The Dean company will build for Colusa, Cal., a new switchboard with 1,500-line ultimate capacity of standard, common battery multiple switchboard type and equipped with 300 lines. A combined toll and chief operator's desk, wire chief's desk, main and intermediate racks, relay rack, complete power plant and standard harmonic ringing equipment go with this order.

THE BERRY LIGHTNING ARRESTER.

The Berry Electric Manufacturing Company, of Marion, Ohio, has begun its third season with a host of satisfied customers in nearly every state and with an unusually bright outlook.

The Berry lightning arrester, which is now familiar to almost all telephone men, is claimed to be giving universal satisfaction, to which is attributable the liberal patronage which the company enjoys.

The arrester consists of two brass tubes, one within the



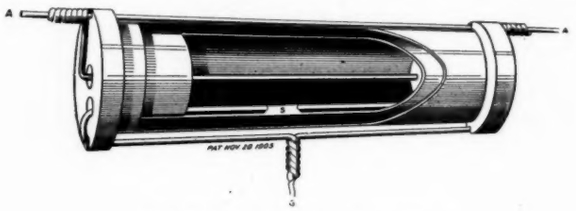
The Berry Lightning Arrester in Service.

other and held firmly in position by porcelain insulators. The inside tube is seven-eighths of an inch in diameter and the larger tube is one and one-eighth inches, leaving an air space three thirty-seconds of an inch between the tubes. It is across this air space that the arc takes place, as the inside tube is permanently connected to the ground and the outside tube to the telephone line. In the accompanying cut, *A-A* represents the telephone line, and is held firmly against the outside tube by a tie-wire which passes through the center of the arrester.

G is the ground wire and is soldered to the inside tube at *S*. This wire is copper and accompanies the arrester when shipped, and is about fifteen inches in length. The cut shows a portion of tubes cut away to show the inside construction.

The area of the inside tube is over twelve square inches, and that of the outside tube over sixteen square inches.

These arresters may be rapidly installed and with but small expense, it is claimed, as it is not necessary to cut a line wire to put them in position and one ground wire may



The Berry Lightning Arrester.

be used for any number of arresters on the same pole. The illustration shows the arresters as they appear on the pole line. One point, which alone makes this kind of a protection a favorite, is the fact that the maintenance expense is very low. There are no carbons to clean nor fuses to replace after a storm and consequently the subscribers are not left without service. Such protection is rapidly becoming very popular among telephone men.

A sample of the Berry lightning arrester will be sent upon receipt of 50 cents.

THE IMPROVED BLACKBURN GROUND CLAMP.

The improved Blackburn ground clamp, which was placed on the market over one year ago, is meeting with approval by both telephone engineers and operating companies who have occasion to make ground connections to pipes. This clamp is known as the No. A1 style and is similar to the original Blackburn No. 1, except that it is so designed that it may be attached without disengaging any of its parts, thereby saving time as well as the danger of misplacing the separated part.

The new improved Blackburn ground clamp consists of a perforated band which can easily be bent around the pipe, with one of the perforations engaging a pin formed at the opposite end of the band.

The screw passing through a nut on the band draws the band tightly against the pipe and at the same time chafes the surface of the pipe in such a manner as to make a good electrical contact. When it is desired to attach to a lead pipe, the screw end is protected with a special foot to prevent it from injuring the pipe. This clamp has been adopted as standard by many of the largest Independent and Bell telephone companies in the United States. The Underwriters' National Electric Association after examination and tests, has approved and listed both the No. 1 and A1 Blackburn ground clamps for use in signaling systems. The sales on these clamps for the past year have increased four times over the sales of the previous year which is very good evidence that they are satisfying the demand for their purpose. Telephone companies and engineers who are interested in knowing how to secure the best ground connection for the least expenditure of time and money, will be benefited by requesting a sample and prices from the manufacturer, Geo. R. Blackburn, Cleveland, Ohio.

CHAS. FARR LAUNCHES NEW COMPANY.

Charles W. Farr, founder and president of the Farr Telephone & Construction Supply Company, of Chicago, has resigned the presidency and managership of that company to become the president and manager of a new company, to be known as the Farr Electric Equipment Company, 170-

172 West Adams street, Chicago. The new company will do a general electric supply business, having already secured good agencies for different lines of electrical goods. This company will manufacture and put on the market the Farr electric deep sea sounding apparatus. The above-named companies are entirely separate and not connected in any way.

THE F. BISSELL COMPANY'S NEW CATALOGUE.

"Why use a frog for a trade mark?" is asked the F. Bissell Co. so often as to constitute in itself the best possible answer. Trade marks are primarily used for advertising effect and that the bull frog trade mark has called forth so many inquiries indicates that it is pretty good advertising. So widespread was the comment aroused by this trade mark last year that the F. Bissell Company did a rather unusual thing to satisfy the curiosity of the trade. A mammoth catalogue of one thousand pages was issued and the entire first page of this catalogue was devoted to answering this question, "Why a frog for a trade-mark?" This thousand page catalogue presents a big investment of time, research and money, and it is really an encyclopedia, but, nevertheless, it is sent absolutely free to all who are interested. If you are among those who want to know why the bull frog was chosen for advertising purposes just ask the F. Bissell Company, Toledo, O., for a copy of this catalogue by the next express.

ACCOUNTING AND MANAGEMENT.

Every telephone man who has to deal with the business management of his company should be provided with a copy of "Quasi-Public Corporation Accounting and Management." Concerning this book it is said that it presents books, forms and methods necessary for the proper organization and management of the business and the recording of essential details of revenue, operation, maintenance and construction; also statements as to profit and loss and assets and liabilities. It covers waterworks, telephone exchanges, electric light plants, electric railway systems, etc.

The chapter devoted to telephone companies contains eleven pages, of which three are taken up by a skeletonized outline of a plan for the classification of revenue, operating and maintenance expenses, fixed charges and construction. The balance of this space is principally devoted to heading of typical books used in keeping these accounts.

STROMBERG-CARLSON SALES.

The Stromberg-Carlson Manufacturing Company, Rochester, N. Y., reports the receipt of signed contracts as follows:

Four sections 980 additional line equipments, Des Moines, Iowa; one section 240 lines central energy visual signal series multiple switchboard, Brookville, Pa.; one section two position toll board equipment, Mt. Pleasant, Iowa; four sections 700 additional line equipments, main exchange, Seattle, Wash.; two sections 300 additional line equipments, Queen Anne exchange, Seattle, Wash.

Thirteen central energy private branch exchange switchboards, Seattle, Wash; central energy private branch exchange switchboard, Louisville, Ky.; Franklin, Pa.; Leavensworth, Kan.; Port Washington, Wis.; Fairport, N. Y.; Louisville, Ky.; Fort Wayne, Ind.; Hammond, Ill.; Magnolia, Ill.; Seattle, Wash.; Buffalo, N. Y.; seven central energy private branch exchange switchboards, Seattle, Wash.; Breckenridge, Pa.; Harrisburg, Pa.; Rochester, N. Y.; Leavensworth, Kan.; Minier, Ill.; Eden, Ill.; Golconda, Ill.; Arcanum, Ohio; Joy, Ill.; Garfield, Ky.; Kershaw, S. C.; Jones, Mich.; Cleopatra, Mo.; Keokee, Va.; Venus, Pa.; Mt. Etna, Iowa; Dresden, Tenn.; three generator call switchboards, Seattle, Wash.; four generator call switchboards, Sunnyside, Wash.; Pomona, Ill.; Peck, Idaho; Culdesac, Idaho; Des Moines, Iowa; Madison, Wis.; Louisville, Ky.; Des Moines, Iowa. Sales of over 2,000 central energy telephones also are reported.

INTERNATIONAL'S INSTALLATIONS.

The International Telephone Manufacturing Company, Chicago, has recently completed the installation of a 4,800-line capacity, 750-line equipped, lamp signal, central energy multiple switchboard at Fort William, Ont., and a 500-line equipped, lamp signal central energy trunking switchboard at Westfort, Ont. The rapid growth of the Fort William plant has necessitated placing an order for an additional 450 lines to the exchange to be installed at once. The International company also is at present installing a 4,800-line capacity, 1,200-line equipped, lamp signal, central energy multiple switchboard and central office apparatus at Port Arthur, Ont., and is manufacturing equipment for an additional section of 450 lines to the 4,800-line capacity. 1,200-line equipped central energy, multiple switchboard installed at Meridian, Miss., last season, as well as an additional section to the central energy multiple switchboard installed at Saratoga Springs, N. Y., four years ago. In addition to these orders a large number of self-restoring drop switchboards and telephones are being sold and installed in various parts of the country.

PARTY LINE CONDENSERS.

A condenser on a party line telephone is said to be a decided advantage, because it prevents "rubber necks" from interfering with the rings which go over the line. The ordinary tin case condenser, which sells at about 50 cents, will accomplish this result perfectly, it is claimed. The new Andrae patented iron-case condensers are gaining popularity because, though higher in price than the tin case type, they can be attached by anyone and do not require the services of a telephone man to connect them to the instruments. It is because of the trouble incident to changing connections and re-soldering joints on the inside of the telephone when putting in a condenser, that the patented form is becoming so popular. It is fitted with binding posts and an iron cover which will not only protect it from damage, but make it possible to connect to the telephone on the outside in ten minutes' time without interfering with the circuits. The demand reported by the Andrae Company of this instrument seems to indicate that it is filling a long felt want.

A TELEPHONE CABLE BARGAIN.

The Central Telephone & Electric Company, St. Louis, Mo., has on hand for immediate shipment at very attractive prices, because purchased before the advance in the cost of raw material, a considerable quantity of standard size telephone cable, on which it will be pleased to make quotation for spring construction work. There are many other items on which the company is in a position to make special quotations, and it will be to the advantage of telephone buyers this spring to communicate with it promptly.

AN EFFICIENT BLIND OPERATOR.

Susie Davis, a girl of 20, who has been blind from infancy, is the most accurate and rapid telephone operator in the Virginia City, Nevada, telephone exchange. When she first applied for the place she was told that it would be impossible for her to manage the switchboard without seeing it, as no other blind person had ever been employed in the telephone service. She persisted and finally got a trial. She learned every number on her board so well that in a recent competition in Virginia City to determine the most efficient operator she beat all competitors. She is a graduate of the school for the blind at Berkeley, Cal.

ITEMS FROM THE RURAL LINE DISTRICTS

Illustrated by O. H. Brandenburg

Bolette is after a telephone exchange.—*Grafton (N. D.) Times.*

The line from Sporting Hill to Mount Joy was connected with the exchange here this week.—*Mt. Joy (Pa.) Herald.*

Mr. Weed of Essex was in town the other day to install a telephone line.—*Buck Hollow Correspondence Burlington (Va.) Free Press.*

The Tri-State Telephone Company will put in a telephone for Louis Stavem in a few days.—*Elm Park Correspondence Cambridge (Minn.).*

Miss Elota Binnex, the night central in the Mutual telephone office, was on the sick list several days this week.—*Council Bluffs (Ia.) Nonpareil.*

E. L. Divan, general manager of the Browntown Telephone Company, was transacting at Winslow and Martin Saturday.—*Monroe (Wis.) Gazette.*

G. E. Ross, manager of the Northern Telephone Company, attended both the telephone and Shrine meeting in Sioux City last week.—*Storm Lake (Ia.) Pilot-Tribune.*

The Cross Roads Telephone Company met on Friday evening at the Cross Roads school house. A few from here were present.—*Louisa Correspondence Warren (Ill.) Sentinel.*

D. A. Shaw was here from Knobnoster, Wednesday, circulating among friends. He is engaged in building telephones in that section of the universe.—*Warrensburg (Mo.) Herald.*

The Citizens' Telephone central office is soon to be moved to Gilson's & Laverly's meat market. Everett Cole will still be "hello boy" for the present.—*St. Johnsburg (Vt.) Calendar.*

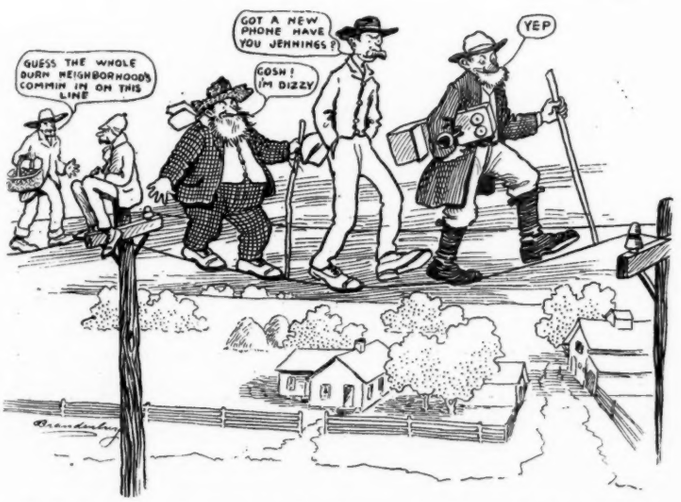
George Mummey, local manager of the New State Telephone Exchange, took a drive along the company's toll line from here to Missouri Valley Tuesday, inspecting the same.—*Onawa (Ia.) Sentinel.*

The Rough and Ready Telephone Company No. 7 is busy constructing their line, and within a few days will be ready to answer their hello calls.—*Twelve Mile Prairie Letter New Athens (Ill.) Journal.*

The turn out to the meeting of the honorable board representatives of the telephone association of Chelsea was full to overflowing. The business was conducted in the usual way and the treasurer shows a full pocket to meet all requirements. We concluded to trot the same old track.—*Bug Hill Correspondence Chelsea (Ia.) Independent.*

YES ITS BORN AND McGINLEY, CHIN WAGGIN FER ALL THEIR WORTH
I DON'T MIND THE MUMPS SO MUCH, BUT IT GOES AGIN THE GRAIN TO SET HERE AND LET THEM OLD GEEZERS DO ALL THE YARNIN.
Brandenburg

John T. Mugg, with the Lafayette Telephone Company, has been nursing a case of the mumps for some days, but is better now. John says that the main inconvenience came about through not being able to talk with his accustomed volubility. He is of the opinion that in the crippled condition of his jaws, both Isaac Born and F. E. D. McGinley would be able to very nearly compete with him in chin wagging.—*Lafayette (Ind.) Leader.*


GUESS THE WHOLE DURN NEIGHBORHOOD'S COMMIN IN ON THIS LINE
GOSH! I'M DIZZY
GOT A NEW PHONE HAVE YOU JENNINGS?
YEP
Brandenburg

E. F. Jennings, from down the river on the Channel place, bought a new phone last week. He is on a line entering the Consolidated switchboard here. Mr. Helmick and others in the vicinity are also coming in on that line.—*Parsons (W. Va.) County Seat Clipper.*

Alfred Brueske, Ben Klug and the butter maker of Leaf Valley transacted business here Tuesday. The officers of the Farmers' Telephone Company held their meeting Tuesday.—*Alexandria (Minn.) News.*

Justice of the Peace Nick Schmidt, came up from Walker Monday to secure telephone supplies. He says the Independent line is enlarging its territory in the eastern part of the county.—*Hays City (Kan.) News.*

Miss Mamie Riley, an employe of the Independent Telephone Exchange, was able to be out to church Sunday for the first time since the accident at the skating rink in which her ankle was broken by a fall.—*Greensburg (Ind.) Review.*

Mr. Bunce, the Bell telephone man, who has been here some time, has resigned and gone to Nebraska for a visit. He has been engaged by another telephone company at a very material increase in salary.—*Manhattan (Kan.) Nationalist.*

P. P. White, manager of the Golden Rod Telephone Company, was up from Wahoo two days last week making arrangements for some one to take charge of the exchange here, Miss Opal Holloway having resigned.—*Fremont (Neb.) Tribune.*

The Horse Run telephone line will be divided near the residence of A. J. Brown. A number of new telephones will be placed on each line. The south line will run direct from Hoskinsville to Belle Valley.—*Belle Valley Letter Zanesville (O.) Signal.*

The Leonore Telephone Company experienced a "tempest in a teapot" last week. However, after considerable blowing, the storm subsided without doing any serious damage, and now everything is quiet.—*Leonore Correspondence Streator (Ill.) Free Press.*

Pat Fay, the efficient foreman of the Northern Telephone Company of Bottineau, was in the city on Tuesday looking after the lines in this city, some of which had gotten out of working order.—*Willow City Correspondence Bottineau (N. D.) Courant.*

The directors of the Farmers' Telephone Company are experiencing some difficulty in securing some one to take charge of the central office, since Mrs. Jackson is now contemplating removal from our midst.—*Watkins Correspondence Vinton (Ia.) Review.*

The telephone line is a sure thing. Officers and linemen were elected at the meeting Saturday night. Another meeting will be held Wednesday night to decide definitely about the matter, and then hurrah for the building of the line!—*Hastings (Mich.) Herald.*

The Farmers' Telephone Company were destined to have another telephone go up in smoke last Wednesday morning with the burning of Lew Armstrong's house at North Hampton, making two destroyed by fire in about three weeks.—*Princeville (Ill.) Telephone.*